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DOMESTIC SCIENCE

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DOMESTIC SCIENCE

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PREPARING A MEAL.

Domestic Science Class at Work in School Kitchen.

Frontispiece

DOMESTIC SCIENCE

BY

IDA HOOD CLARK

SUPERVISOR OF ELEMENTARY MANUAL TRAINING IN
THE PUBLIC SCHOOLS OF MILWAUKEE

ILLUSTRATED

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TO THE

AMERICAN TEACHERS AND PUPILS

OF OUR PUBLIC, PRIVATE AND RURAL SCHOOLS, WHO ARE INTERESTED IN THE UPBUILDING OF THAT GREATEST OF ALL INSTITUTIONS — THE HOME — THIS BOOK IS SINCERELY DEDICATED.

PREFACE

THIS book has been written in the belief that there is need for a course of lessons in Domestic Science planned for the elementary schools. The course may be used in all grades above the third, and some of the lessons may be simplified and taught in the first three grades. These lessons may also be used in the first-year and second-year high school classes, and in other secondary schools. They are suitable for public, private and rural schools. Teachers who have absolutely no knowledge of Domestic Science can teach them by carefully reading them over and performing the work as directed.

Every school should have its own laboratory, and each grade teacher may give instructions in this subject even better than a special teacher, for she is more closely in touch with the children under her care and she knows their needs, environment, and capabilities. Following the plan of lessons, boys and girls both may have instruction in this important subject, which is vital to the interests of a well-ordered home.

Every pupil should be provided with a book and the subject-matter prepared as in any other branch of study. Much valuable time may thus be saved and utilized for necessary discussion.

One great reason why Domestic Science has not been more generally introduced in schools of all kinds is that the public, generally speaking, is under

the impression that it is expensive. It need not be so. A kitchen or laboratory may be provided with all necessary equipment for $300 to $350. More elaborate equipment creates a wrong impression among the people and operates to the disadvantage of the work.

The " center plan," now in vogue in nearly all the large school systems, has proven, in many cases, unsatisfactory. The pupils in all grades in the elementary schools should be provided for in their own buildings. The money spent on the salary of a special teacher will equip the school shop and the school kitchen, and there is no more reason why there should be a special teacher in Domestic Science, in the elementary school, than in any other subject.

The lessons consist of two years' work, thirty-six lessons in each year's course. Reviews and examinations may be given each term if desired.

The course is planned with reference to scientific principles of practical cookery, based on the chemistry of foods. The author herself has taught all the lessons contained in this book and feels that she is offering to the public results obtained through several years of successful experience.

IDA HOOD CLARK.

Supervisor of Elementary Manual Training in the Milwaukee Public Schools

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Introduction

Domestic Science is usually given to the girls of the seventh and eighth grades in the public and private schools. Advanced courses in this subject may be given in the high school. There is no good reason why children below these grades should not take the course, but owing to present school conditions — too many pupils for one teacher and an overcrowded course of study — it seems impossible to secure more than one form of hand work or manual training at a time; so the course in cooking or domestic science has usually been arranged for the girls of the seventh and eighth grades, allowing one and one-half hours each week for one lesson. Two hours is a much better period.

Centers are conveniently situated for the pupils of these grades in adjacent buildings. The ideal plan is a laboratory and shop in each school-building, so that children in all grades, both boys and girls, may take work in Domestic Science. The school program should be arranged so that the boys go to the shops at the same time that the girls go to the laboratory, and, if possible, the centers should be located in the same building. The laboratories and shops are usually equipped for twenty-four pupils.

The laboratory equipment may be made simple or elaborate. In public-school work it should be inex-

pensive but good. Two rooms are almost necessary, one for the kitchen or laboratory, and the other for the dining-room, where the girls are taught serving and care of the dining-room. One large room may be used if two are not available. Two smaller rooms should be secured, if possible, for a laundry and a dressing-room.

The laboratory should be well-lighted, thoroughly ventilated and comfortably heated. Six separate tables may be made, planned for four girls at each; or one large table may be arranged in a semi-circle around the instructor's table, which should be placed at the point where the half circle ends; or the large table may be in the form of an oblong, leaving an opening at one of the short sides, and the instructor's table placed in the center. It is less expensive to have the single table.

If gas is used, twelve gas plates are needed, for the work is so arranged that two girls work together at one plate. One extra gas plate is needed for the instructor's use in demonstrating the lesson and in performing experiments before the class. Blue-flame oil stoves may be used.

The necessary utensils are placed in drawers, made purposely for the tables, when these are separate, or on shelves arranged below the long tables. The drawer arrangement is of course much better, as it keeps dust away from the utensils.

The girls are required to keep these drawers or shelves in perfect order. Each girl should have a certain place for each utensil, and keep that particular utensil in it, so that each class shall find the laboratory in order at the beginning of each lesson.

A list of utensils, for two girls, to be kept in drawers or on shelves, includes:

2 common white dinner plates.
2 common white saucers.
2 common white cups.
2 tablespoons (nickel plated).
2 teaspoons (nickel plated).
1 large knife, dinner size, wood or bone handle.
1 vegetable-knife.
2 forks, wood or bone handle.
2 tin pie-plates (large size).
2 tin pie-plates (small size).
1 potato-masher, wooden or wire.
1 double boiler (small size).
1 pt. pan (agate ware).
½ pt. pan (agate ware).
¼ pt. pan (agate ware).
1 iron dishcloth.
1 small size saucepan with handle and cover.
1 pt. yellow bowl.
½ pt. yellow bowl.
2 qt. yellow bowl.
1 glass lemon-squeezer.
1 wooden spoon (medium size).
1 bread-knife.
1 dish-drainer.
1 soap-dish, (small size).
1 dish for sapolio (small size).
1 rolling-pin (small size).
1 standard measuring-glass (½ pt.).
1 bowl for garbage and refuse (2 qt.).
1 salt-box (tin).
1 pepper-box (tin).

1 match-holder (small).
1 match-receiver (small).
1 wire egg-beater.
1 Dover egg-beater.
1 salt-spoon (ivory or bone).
1 strainer (wire).
1 white pitcher for water (2 qt.).
1 medium size dishpan.
(These are hung on hooks at sides of separate tables, or are collected and placed in closet when long tables are used.)
1 biscuit-cutter.
1 ginger-snap cutter.

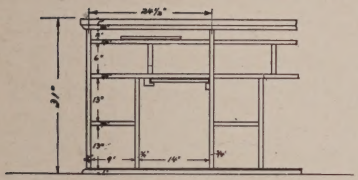
Where drawers are used, place all the large utensils in the one deep drawer, which on one side of the table is at the right and at the other side at the left. In the two shallow drawers, placed alternately on each side of the table, keep the spoons, cups, plates, dish-drainer, pie-plates, rolling-pin, wire dishcloth, and saucers. The other utensils can be put in the deep drawer. Place pepper and salt, match-holder and receiver, on the table directly under the gas pipe, which feeds the two plates, or at one side of the oil stoves.

Where circular or oblong tables are used, place these utensils on shelves under the tables, the larger and higher utensils on the deep shelves and the others on the narrow or shallow shelves. Assign the places to the girls and give directions to the class to keep everything always in the same place.

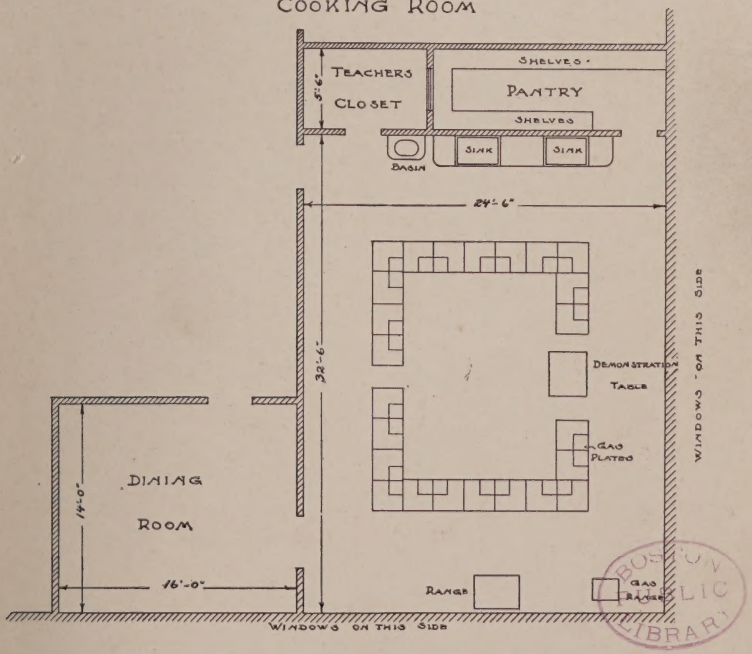
The laboratory is further furnished with a gas range and a coal range, in which both wood and coal may be used. These are for teaching baking,

TYPICAL COOKING ROOM
PUBLIC SCHOOLS
CITY OF MILWAUKEE

COOKING TABLES



COOKING ROOM



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roasting, and group lessons that cannot be done on the individual stoves, as well as for lessons in making fires, care of stoves, the use of stoves at home, etc. The large stoves are not absolutely necessary, as small ovens may be used on the gas plates, or oil stoves.

A sink with an extension, a garbage pail placed at the side, a strainer over the opening in the sink, a soap-dish, a roller-towel placed at the left of the sink, a row of kitchen cabinets for extra dishes, and a china closet for a dinner set should be provided. The cabinets should contain drawers for table linen, towels, dishcloth, silence cloth, napkins, extra cloths, etc. The lower part may hold large kettles, waffle-irons, etc.

There should be a supply table for supplies, which two pupils, appointed from each class, are to keep in order and properly provided.

The lockers for pupils' uniforms may be kept in the laboratory, but it is much better to have a dressing-room. Here the girls take off their wraps and put on a uniform, consisting of cap, apron and sleevelets, or a large apron with sleeves. A glass should be in the room, so that the girls may put on their caps neatly. These uniforms should be all white. In schools where the girls sew, they may make the uniforms in the sixth grade. A towel rack should be placed in the laundry room, if there is one, and after the dishes are washed and put away the girls take turns each week in washing out the towels used. One week a girl washes the dishes and the next week she dries them; the one who dries them usually washes the towel, as her partner is busy putting away the dishpan, etc.

The dishcloths are always washed. They are hung on the dishtowel rack, and another set of towels, twelve in number, one for two girls, is taken from the rack or drawer.

Three dozen towels are needed for the use of three classes. Two dozen dishcloths are required, as they can be used without waiting for them to dry. A tub, washboard and a wringer are needed in the laundry. The extra dishes and utensils needed are placed in one of the cabinets or closets.

For general equipment in the dining-room, a small dinner set in a china closet is sufficient. This may be selected, as a whole set is not necessary, — only enough to show the setting of a table and the serving. Silver knives, forks, and teaspoons, half a dozen of each, are necessary.

6 soup-plates and soup-spoons.
12 small sized coffee-pots (½ pt.).
12 small sized tea-pots (½ pt.).
12 cake pans — 4 inch.
12 toasters (medium size).
12 bread pans, 8 in. by 4 in. by 5½ in.
(These bread pans must be made to order.)
1 waffle-iron.
2 large kettles (iron).
3 large cake pans.
4 muffin-pans.
2 sadirons.
1 iron stand for flatiron.
12 pint jars for fruit-canning.
6 quart jars to hold supplies.
1 large salt-jar to hold salt.
1 large sugar-jar to hold sugar.

2 flour pails (large size).
12 small size wooden bowls.
12 small size chopping knives.
12 jelly glasses with covers.
12 croquette moulds.
1 chocolate pot.
1 large coffee pot (2 qt.).
1 large tea pot (2 qt.).
1 large baking pan.
1 large meat pan.
1 large bread pan.
2 large-sized bowls.
1 4-qt. molasses jug.
1 4-qt. vinegar jug.
1 large size milk can.
1 freezer.
1 large size wooden bowl.
1 water filterer.
1 broom.
1 dust pan.
24 wooden stools for girls to sit at tables while taking notes, etc.

The dining-room may be furnished as follows:—

A table, round or square.
Half dozen chairs.
China closet.
Rug for the floor.
Plain curtains or shades.
Sideboard or buffet.
A refrigerator should be placed in the laundry. If no laundry is possible, place refrigerator and tub, etc., in laboratory. In this case screens may be used.

Three classes can be taught each day, the first class reporting at 8:30 and leaving at 10. The next class comes in at 10:30 and stays until 12. Two each day is a better arrangement. At the first lesson seats and lockers are assigned.

Girls should have note-books in which to take notes and recipes from the blackboard and write up the lesson. About once in each month the instructor should mark the books.

To economize in both material and time, arrange an individual recipe with each lesson and have two girls prepare the recipe. The large recipe is for home use. Each girl is to cook at home what she has cooked at school that same week, and report on this the following week. This may be counted as one-half of the mark for each lesson.

The two girls who act as housekeepers for the class must have everything on the tables that will be needed for cooking, and extra supplies on the supply table for emergencies. If anything is needed from the supply table the housekeepers are to take it to the table where it is needed. They refill the water pitchers for the next class. They wash the sink and extension. They look over all the tables at the close of the lesson and report to the teacher that these are or are not in perfect order. They attend to the fire in a baking lesson, and see that the tea-kettle is full of hot water for washing extra dishes. They see that the towels are hung properly on the rack to dry and that supplies are on the table for the next class. Housekeepers who serve at the lesson that comes in the afternoon are to see that the supply table is in perfect order and all extra dishes put away.

SIMPLE COOKING UNIFORM.
Material, white percale, dotted with black (six yards).

SERVING APRON.
Material, barred muslin and embroidery.

ANOTHER COOKING UNIFORM.
All these are to be made by girls in the sewing-classes.

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For dish-washing have plenty of hot water ready. If a range is used this will be ready, and the dish-washer may go to the sink and get the water. If no range is used the large tea-kettle may be filled and the water heated on the gas or oil stove, or each girl may heat water on her own gas plate. Scrape the plates thoroughly. Wash the glasses first in hot, soapy water; then the silver, cups, saucers and plates; lastly the baking dishes. Rinse thoroughly and use a dry towel to wipe the dishes.

Just before the dish-washing, housekeepers should fold the towels and dishcloths for the next class and place them on each table, ready for use.

Girls should all wear caps, aprons and sleevelets. These are to be made in the sewing classes, and are to be kept in lockers or closets, whichever are provided. At the first lesson assign to each girl a permanent place.

Girls not supplied with uniforms are told what to get and are expected to supply themselves, if possible.

The cooking uniform may be made of India lawn. It requires about 4½ yards of material for girls of medium size and 5 yards for the larger girls. Each girl should have a cap, made with elastic, that will fit the head.

The apron may be made as long as a girl's dress, with or without a bib. Make sleevelets that will come up above the elbow, with elastic there and at the wrist.

For the first lesson tell the class something about cookery, as suggested in this outline, and about the objects of cooking. Explain to them the places where utensils are to be kept, and how important

it is that these utensils shall be kept in their places, and that all girls are to leave the laboratory exactly as they find it — in perfect order. Make this very important. It is one of the essential features of this work in Domestic Science. Devote the remainder of the time to the explanation of fire, the stoves, and combustion of air. Demonstrate the cook-stove in the laboratory and explain the parts of it to pupils, such as fire-box, ash-pan, oven. Show that the oven is heated by a circulation of hot air through a space between the oven and the top of the stove. Show pupils how to make a fire in a coal range. First, free the grate from ashes, close all dampers, and put covers on so that ashes will not fly out into the room.

Shavings or twisted paper may be placed on the grate. Small sticks or a bundle of kindling wood, such as is now sold by the grocers in large cities, may be placed over the paper and shavings. Cover the stove, open the damper and light the shavings or paper. At the close of each lesson have the girls put their uniforms away. Dismiss each class promptly.

The class should not cook until the second lesson, at least. The first must be a preparation for cooking.

List of Abbreviations for Future Reference

tsp.	teaspoon	gal.	gallon
tbsp.	tablespoon	l.	level
s. s.	salt-spoon	r.	rounded
c.	cup	h.	heaping
spk.	speck	m.	minute
pt.	pint	hr.	hour
qt.	quart		

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HOUSEKEEPERS ARRANGING FOR THE MORNING LESSON.
Ironing Towels, Mixing Bread, etc.

COOKING

Lesson I

We cook food to nourish the body, and to make the food more digestible and attractive.

But cooking or Domestic Science goes much further than the mere skill to produce palatable and digestible dishes.

The materials used in cooking become of interest. The history of food, which is the history of the physical man, is then opened to pupils, as food has been and is the development of man.

History, too, brings its opportunity with its description of the home life of primitive people and the evolutions of the kitchen equipment and appliances, the gas and electric stoves, etc.

The relation to geography, too, is most interesting; the people of the earth, their probable food and dress, methods of preparation, etc.

We must learn physiology, the most important of all studies, wisely through an interest in our own growth in stature and in power, and this must come through nutrition.

Arithmetic may have a very natural relation, addition, subtraction and discussion of simple fractions in recipes and in changing cup, teaspoon and tablespoon measurements into weight computation — the cost of living, as all the business side of managing a home should be intelligently learned by children. Children in all grades may have a lesson in Domestic

Science each day, or at least one or two lessons each week.

The younger children may cook cereals, vegetables and eggs, make simple beverages and wash dishes. The older children may sweep, dust and cook from real recipes, arrange flowers and set the table, learning to cook and to serve a simple meal. Boys and girls alike should share in the simple tasks necessary to the welfare and comfort of those who comprise the home.

In the rural school, or in fact in any school, the children may cook and serve the noon luncheon, needed at the noon hour.

The children may bring the materials from home, and hot luncheon may then be served, instead of the usual cold, unattractive luncheon packed early in the day.

The school luncheon could be planned the day before, and each child told what to bring. Groups of children may be made responsible for some part of the work. The work in school gardening could be brought in here and the products used in the cooking classes. Canning fruits, making soups from vegetables, etc.

Much of the work in language reading, nature study and arithmetic could be related to the gardening and Domestic Science.

A large part of the equipment in the school could be made by the older pupils, either in the Manual Training classes, or after the regular school hours. Long tables for serving the meals, a work table and benches on which oil or gas stoves may be placed, are easily constructed, as the school carpenter may

be called in to help. This could be a fine beginning and have the effect of interesting the school authorities.

In some schools the course of study in each grade could be so arranged that cooking could be taught in connection with science, studying foods as a source of energy; the study of food principles, value of each, effect of the processes of cooking upon the various food principles.

The classification of food; cooking — effect of heat upon different foods; digestion — how food is made soluble; absorption — how food gets into the blood; circulation — how food reaches the muscles; respiration — how waste tissue is removed; study of plants as a source of oxygen and food; formation of starch and oxygen by plants from carbon dioxide and water.

The boys and girls will want to know the scientific principle of their local industries and there are often food manufacturing plants. These should be visited by the classes, and made an important feature of the school work. The habit of investigating one's surroundings is a good one, and this habit formed in the early life of a child will lead him to make a study of each new environment, and in this way come into intelligent knowledge and relation of it.

The time of year must also be considered, when foods are in season and less expensive.

At Christmas time in schools where there is a school kitchen, the younger children may pop corn and make butter scotch, cream and hard candies.

Cooking is an art, and artistic and dainty serving is very closely connected with dainty cooking.

Pupils should consider the serving a very important part of the course. Prof. Atwater says, "Dainty ways of serving food have a usefulness beyond their æsthetic value. Every one knows that a feeble appetite is often tempted by a tastefully garnished dish when the same material carelessly served would seem quite unpalatable." Furthermore, many cheap articles and "left overs" when well seasoned and attractively served may be just as appetizing as dearer ones, and will usually be found quite as nutritious.

Every food product contains certain elements upon which its food value depends. Therefore it is important that the nutritive value of foods is retained in the cooking.

It is equally important that we know the chemical composition of foods, in order to intelligently combine materials used in cooking.

POTATOES

Lesson II

History. Authorities differ as to where the potato was first discovered by the Indians — in North or in South America. Early in the 15th century the potato was introduced into Europe by Spaniards. In 1586 it was brought to England from Virginia, where it

had probably become
Its progress in Euro
even in Ireland, was n
the 18th century. It is
the temperate climates.

The Potato Plant. The
a worthless green berry.
tubers, or enlargements
which are larger under cul
plant. Round or oblong ey
mentary leaves, containing se
which the plants are usually
should be cut off, as they use
in the potato.

Composition of Potato: Wate
21%; proteid, 2%; mineral, 1%;

Notice that this is a starchy
nitrogenous or proteid elements.
are cooked in boiling salted water.
at a slightly higher temperature tl
which boils at about 212° F.

If potatoes are put in cold water
water penetrates and softens the
making the potato soggy. Soggy pot
digestible. To prove that cold water
starch grains take a spoonful of common
dissolve it in cold water. Then pour in bo
and it makes a smooth paste, because th
grains have swollen and burst.

Boiled and Mashed Potato — Home Recipe.
and peel four medium-sized potatoes, and cover t
with boiling salted water. Two girls cook togethe
One of the two may prepare the potatoes while th

es the salt and lights
e process of cooking.
sses, i. e. the peeling of
of the water, completed
atoes should be put into
not possible to have both
e, place the potatoes in
ites, so that they will not
starch is thereby lost, as
Have the potatoes of uniform
done at about the same time.
of water with a thermometer,
ot, it can always be determined
bbles appear on top of the water.
ly.

– **Mashed Potato.** One-half or 1
. water, ½ tsp. salt, 1 tsp. milk, s. s.
er.

es longer to boil than plain water,
hotter when it does boil. By slightly
ling-point of water with salt the po-
to cook more quickly. They must not
o boil too rapidly, nor allowed to stop
hey will break into pieces before they
d be penetrated by the water and become
ry the potatoes with a fork. When soft,
the water quickly and let steam escape by
off the cover, otherwise the steam will pene-
he starch grains and the potatoes become soggy.
e over gas-plate or fire a few minutes so they will
y. Mash with a wire masher and add two tbsp.
f milk, one level tsp. of butter, one half tsp.(l.) salt.
Keep mashing until smooth. Potatoes may be

beaten with a spoon until they are very smooth and white.

Potato Balls. Roll mashed potatoes into rolls, flatten into small cakes, put on buttered pans with a small piece of butter on top of each cake, and brown in the oven.

CEREALS

Lesson III

Cereals are edible grains. They are made from wheat, corn, rye, barley, oats and rice.

They are very important foods, as they are cheap and nutritious. Compared with potatoes they contain much less water, and so need long cooking in water to soften the starch. They should be cooked in a double boiler, if possible. If one has no double boiler at home, one may be improvised by setting one saucepan inside the other. Cooking in a double boiler is really steaming the cereal, as the food in the upper part does not get to the boiling point (212°). In using a double boiler, fill the lower part about one-third full and keep it boiling, if possible. You may need to add more boiling water to keep it one-third full.

Cereals require long, slow cooking. Usually too little time is given to cook oatmeal. A general rule for cooking cereals — a teaspoonful salt to one quart of water, add one cup of the cereal and when the whole boils, after all the cereal is added, place over hot water and cook without stirring the required time.

Oatmeal,	6 hrs.	Cornmeal,	4 to 6 hrs.
Hominy,	4 hrs.	Rice,	45 minutes.
Cracked wheat,	2 hrs.		

Usually double the time given on packages of cereals. Cereals should be bought in small quantities and kept in glass jars covered tightly.

For the practice work in this lesson we may cook rice, as rice ranks next to wheat in amount consumed.

History. The rice plant grows wild in India and Australia. It is cultivated in China, Brazil and in southern United States. Rice is valuable as food as it is a heat-producer. There are two great classes of rice and over two hundred varieties.

Rice should be eaten with a nitrogenous or muscle-building food, as meat or cheese, or with a fatty food, butter and bacon, as it has less fat and more starch than any other grain.

Composition. Starch, 79.4%; water, 12.4%; mineral, .4%; nitrogen, 7.4%; fat and oil, .4%. They are largely composed of starch and tough wood fibre so that long and thorough cooking is necessary.

Boiled Rice — Home Recipe. Rice should be well washed in several waters. Have two quarts of water, with 1 tablespoon of salt, boiling rapidly in an uncovered kettle. Put in one cup of well-washed rice and let the water boil fast. Skim and stir with a fork. Cook from ten to thirty minutes, according to the age of the rice. Add more boiling water, if necessary. When grains become soft, steam in a steamer. Put rice, still uncovered, in an oven or on the back of a stove to dry off. Stir and let steam escape. If cooked too slowly or too

long, the grains absorb the water and become soggy. If cooked enough to break the starch grains, they will stick together.

Blanched Rice. Place the rice over a hot fire in a large saucepan of cold water and stir occasionally while heating. Boil 5 m. and drain on a sieve. Pour cold water through it. Return to fire in hot liquid and cook rapidly, and finish cooking in double boiler until liquid is absorbed. If cooked in milk cook at once, after blanching, in a double boiler.

ORDER OF LESSON

1. Discussion of cereals from notes in books and then pupils give class some added information they have found in books of reference or encyclopedias.
2. Cook rice as directed in recipe. Cook at home, this week, in double boiler.
3. Serve rice, with cream, milk and sugar, or eat as a vegetable, with butter and a little salt.
4. Put laboratory in order.
5. Review discussion, if time.

MACARONI

LESSON IV

Macaroni is a valuable food as it contains a large amount of starch and is also quite rich in muscle-building or nitrogenous food.

Composition. Proteid 11.7%, fat 1.6%, starch 72.9%, mineral 3%, water 10.8%.

Macaroni may be used as the principal dish at a

meal, or served with cheese it takes the place of meat, although alone it does not contain the necessary amount of proteid food for a laborer.

History. Italy sends us fine macaroni, as the climate there is warm and the spring wheat grows rapidly and produces a good quality of gluten, from which the macaroni is made.

Any wheat grain rich in gluten makes excellent macaroni. The Dakotas in the United States produce good wheat for macaroni. Good macaroni is hard, elastic and has a rough surface. The best is grayish white rather than a starchy white.

Pupils may bring information regarding manufacture and history of macaroni, from book of reference and encyclopedias. The manufacture of macaroni should be discussed and notes made in note books.

Manufacture. Macaroni, spaghetti, and vermicelli are used in Italy for breads. They are made from wheat flour that is made into a dough with boiling water.

A stiff mixture of the glutinous flour and hot water is made and put into cylinders, that have a perforated disk at the end. The paste is forced through these holes in threads, rods or tubes. The threads make vermicelli, the rods spaghetti, and the tubes macaroni. Macaroni made in Italy dries by being placed over wooden sticks, hung in the open air, or in ovens, while macaroni made in America is dried on flat, cloth-covered frames. French macaroni is considered as good as Italian macaroni. Excellent macaroni is made in the United States, although some is deficient in gluten. Macaroni does not

contain enough of the muscle food necessary for a laboring man; hence its use with eggs, meat and cheese is necessary.

Composition of Macaroni. Proteid, 11.7 %; fat, 1.6 %; starch, 72.9 %; mineral, 3 %; water, 10.8 %.

Baked Macaroni with White Sauce — Home Recipe. Cover ¼ lb. macaroni, broken into one-inch pieces, with 3 pts. boiling salted water; boil 20 m. or until soft. Drain in a colander and, when done, pour cold water through it to keep pieces from sticking together. Put in a baking-dish and cover with white sauce. Mix or stir. Then mix ⅔ cup of fine cracker crumbs with ⅓ cup melted butter. Sprinkle over the top. Bake until crumbs are brown. If cheese is liked with it, use ½ cup grated American or any other dry cheese. Put part of it with the macaroni and part with the white sauce.

White Sauce — Home Recipe. 2 tbsp. flour, 2 tbsp. butter, ½ tsp. salt, 1½ cup hot milk.

School Recipe. 1 tsp. flour, 1 tsp. butter, spk. salt, 4 tbsp. milk or ¼ cup.

Macaroni — School Recipe. 1 stick of macaroni for one table; two girls take ½ each. Cover with boiling salted water. Cook until soft. Try with a fork, and serve with white sauce.

Method for White Sauce. Melt butter; when it bubbles add the flour; stir until mixture bubbles; add milk gradually, stirring all the time; when smooth and slightly thick, add salt. Let the girls serve this with wafers or bread and butter. This is a very valuable lesson.

Tomato Sauce — Home Recipe. Fry 1 tbsp. chopped onions in 1 tsp. butter; add 1 large tbsp.

flour. When well mixed, add gradually 1½ cup strained tomato, ½ tsp. salt.

School Recipe. 1 tsp. butter, 1 tsp. flour, spk. salt, ¼ cup strained tomato, spk. minced onion.

Experiment for Pupils. This experiment to test the composition of flour may be given in any lesson where flour is used:

Mix 2 tbsp. flour with 2 tsp. water to form a stiff dough. Knead until smooth. Tie dough securely in a square of coarse muslin cloth and knead in a bowl containing 1 qt. luke-warm water, until white substance ceases to pass out. Save the water; when white substance has settled, drain off the clear water and test for starch. Examine the product (in cloth). Notice color and elasticity. It is the compound of the flour which in macaroni swells and increases in bulk in the cooking. Form part of it into a smooth ball and cook in boiling water. This is the gluten in flour and in wheat. It is the nourishing part of the flour; the part which gives us muscle and tissue.

Test for all Starchy Foods. A weak solution of iodine and alcohol. Apply to foods containing starch, and the starch will turn a dark blue color. Have pupils test rice, flour, potato, also some of the non-starchy foods, and notice the difference.

Order of Lesson

1. History. Discuss this. The teacher places on the board parts of the history and manufacture.
2. Perform experiment for flour.
3. Put on water to boil with salt.
4. When boiling, place ingredient in water.
5. Finish discussion while ingredient is cooking.

6. Talk on nutritive value.
7. Serve macaroni, with wafers.
8. Have one girl make white sauce, if necessary, while the other watches macaroni.
9. Wash dishes.
10. Review discussion.

CORNSTARCH MOULD

LESSON V

Nitrogenous and Carbohydrate principles are the two most important in cookery. Starch represents the carbohydrates; so for the further study of starch and its digestion we will take up a lesson on cornstarch.

The outer covering of plants is called cellulose and within the cellulose is the starch, often called a carbohydrate — a compound that is contained in all plants.

As the practice work in this lesson is quite short, the pupils may take this lesson as a study of digestion of starch. Have all the reading language and geography work for the week center around this subject. Take up subject of Digestion of Starch, and write a composition this week on the subject.

Pupils bring in all information possible in regard

to starch, from chemistries and books of reference, and all sorts of information from books in the Public Library.

Information secured in this way is much more valuable than that given entirely by the teachers, as it leads to pupils forming the excellent habit of finding information for themselves, thus getting into touch with leading and authentic authorities on various subjects.

This general plan of gathering notes on food stuffs should be followed in all the lessons. Pupils should bring in samples of food stuffs procured from wholesale and retail grocers, for each new lesson.

Cornstarch is another starchy food, made from ground Indian corn. The ground corn is then treated with a chemical compound which removes the oil, mineral and proteids; then a powder is produced, called cornstarch. This is nearly pure starch. Arrowroot is the purest form of starch and comes from the West Indies.

Tapioca comes from the roots of a plant that grows in South America.

Starch may be used as a thickening agent. Cold water has no effect on it. Hot water hardens it in lumps.

Experiments. a. Hot water on a cold-water mixture makes a smooth paste.

b. Boiling water on sugar and flour mixture makes a smooth product.

c. Flour and very hot fat form a soluble mixture, dextrine, which is dissolved in liquids, forming a smooth product like gelatine.

These mixtures may be used in cooking for: a,

thickening soups, gravies, sauces; b, for puddings, cream pies, pudding sauces.

Cornstarch Moulds — Home Recipe. 1 qt. milk, 4 tbsp. cornstarch, 4 tbsp. sugar, ½ tsp. salt, 1 tsp. vanilla.

School Recipe. 4 tbsp. milk, 1 tsp. sugar, spk. of salt, 1 tsp. cornstarch, spk. vanilla.

Method. Mix cornstarch with 1 tbsp. milk. Heat rest of milk in double boiler; add sugar and salt to milk. When the milk is hot, or has a scum on it, add mixture of cornstarch and cold milk; or, heat all milk in double boiler, mix sugar, cornstarch and salt, and add to hot milk. Stir until smooth and cook until thick. Place in a wet mould and set aside to cool.

Experiments for Testing Starch. If you have a microscope, cut a thin slice of a raw potato to show cells containing starch. If you have no microscope, hold thin slices of potato toward the light to see the structure, and put drawings in your book showing this structure.

Composition. Small test-tubes can be purchased at any drug store. Place some dry starch in a test-tube and heat. See the change in color, the odor, the moisture on the sides of the tube. Near the end of the experiment light a match and apply to the mouth of the test-tube to ignite the combustible gases which are given off. You may then break the tube and look at the contents. If any nitrogen had been present the odor would have been like burnt feathers.

Action of Cold Water on Starch. Take ¼ tsp. cornstarch and add 2½ tsp. cold water. Mix this thoroughly. Let it stand in cold water until it settles.

When the water is clear, drain it off and dry the starch.

Action of Boiling Water on Starch. Place 2½ tsp. boiling water in a test tube. Add ¼ tsp. dry starch, without stirring. Examine the lumps and explain why it did not dissolve. Again, put 1 tbsp. in boiling-water. Note color. Let stand a short time and examine what settles. Are the results the same?

Action of Heat on cold-water mixture. To ¼ tsp. cornstarch, add 2 tsp. cold water. Mix thoroughly and keep stirring until heat is applied. Use thermometer to find the temperature when the mixture is thick. Where are the starch granules? Thin this mixture with water.

Action of Cold Water on Vegetables. Wash and pare a potato, slice it thin, and let the slices soak in cold water for one-half hour. Look at the water. Drain off the water and apply heat to what was left in the dish. This will thicken; why?

For Boiling Vegetables. Wash and pare two or three potatoes. Put them in boiling water, salted (1 tsp. salt to 1 qt. water). Continue to boil the water until potatoes are soft. Take one or two potatoes from the water and keep in a warm place, not covered. Cook the last potato longer. Now compare the first cooked with the second.

ORDER OF LESSON

1. Discuss starch.
2. Value as food.
3. Experiments.
4. Discuss recipe.
5. Cook and serve.
6. Wash dishes.
7. Review discussion.

EGGS

Lesson VI

Eggs contain nearly all the important food elements in the right proportion to make them an almost perfect food.

Albumen is nitrogenous and is the white of the egg in its purest form. Albumen has different names in different foods: myosin in meat; casein in milk; gluten in wheat. These are examples of real albumen.

As the albumen in eggs contains so much nutritive value, in a condensed form, eggs must be eaten with foods that contain a large amount of starch — potatoes, rice and breadstuffs. Eggs may often be used in place of meat. Eight or nine eggs are equal in value to a pound of meat.

The eggs that are used for food are those of the hen, goose, turkey and duck. The food of the hen often affects the flavor of the eggs.

Eggs have other uses than as food. They are used in dressing leather, photography, for medicinal purposes, and in the arts — printing, dyeing, etc.

Freshness of Eggs. Eggs are perfectly fresh for twenty-four hours only; after that there is an evaporation of the water, when the air gets in and deterioration follows. They are probably at their best when 12 hours old.

Testing Fresh Eggs.

1. Hold eggs to the light, if the center looks clear they are fresh.

Held in front of a lamp in a dark room is called "candling."

2. They are fresh, if they sink in a ten per cent solution of salt water.

3. Fresh eggs have rough shells.

4. Contents of eggs should almost completely fill the shell — white should be jelly-like and not watery.

The principle of preserving eggs is to fill the pores of the shell and keep out the air.

Cold storage or low temperature will preserve eggs.

Exclusion of air by coating or putting them in some solution, or packing in oats, salt or bran.

The best method of preserving eggs known at present according to the United States Bulletin is the use of a solution of water glass or soluble glass. Water glass is sold by the druggists in two forms; a syrup-liquid and a powder, for about ten cents a pound. A solution may be made by using one part of the syrup water glass in ten parts of water. Use pure water, that has been boiled and cooled before mixing with the water glass. Pour this solution over the eggs that are carefully packed. The bowl, keg or barrel must be very clean. Then place the eggs in a cool place. When using this solution do not wash the eggs, but pack the clean ones.

One experiment station says that "one gallon of water glass will make a solution for fifty dozen eggs, if they are properly packed."

By experiment it was found that at the end of three and a half months eggs that were preserved the first part of August still appeared perfectly fresh.

The water glass solution is now regarded as one of the most popular and widely used preservatives and although it was recently introduced, it has increased the preservation of eggs on a small scale in the home. Eggs can be obtained when cheap and preserved for use in the winter months. They will keep for a year and not decay.

Digestibility of Eggs. Time and the amount of material which any food gives to the body as it goes through the digestive organs seems to be the test of thoroughness of digestion. At the experiment station, fresh raw eggs beaten were found to digest in one and a half hours. Hard-cooked and fried eggs required about three and a half hours for digestion in the stomach. Soft-cooked eggs, about three hours. The pupils may like to know that digestion of foods is not completed in the stomach, and that only food that is soluble can pass through the walls of the stomach and intestines and be taken up into the blood to nourish the body. These foods are made soluble by the action of the digestive juices of the stomach. The digestion of an ordinary meal consisting of meat, bread, etc., is from three to three and a half hours.

Composition of Eggs — Total Weight

Shell about	11%
Yolk	32%
White	57%

General Composition

Proteid	14.9%
Fat	10.6%
Mineral	1%
Water	73.5%

Food Value. From this we may conclude eggs have a high food value and they are an important article of diet in every household. Eight or nine eggs are equal in nutritive value to a pound of beef, so when eggs are cheap they are an inexpensive form of nutriment.

Food Value. Eggs possess their highest nutritive value when raw. Albumen subjected to a very high temperature of heat becomes indigestible. The yolk of the egg is rich in fat and in sulphur, and therefore the freshness soon departs, so that it should not be retained in the stomach any longer than the average time for digestion. The white contains about two parts fat, while the yolk contains about thirty parts.

Eggs are more quickly and easily digested when the yolks and whites are thoroughly beaten together before cooking, as in scrambled eggs.

Many people find the yolks of eggs too rich for them, while they eat the whites and digest them easily.

It is poor economy to use stale eggs. If possible use fresh eggs, even for cooking, and economize in something else, as fresh eggs properly prepared at breakfast time mean so much to the health and happiness of the members of the family.

Cooking and Serving Eggs. The methods of serving and cooking eggs are many. They often take the place of meat. Eggs are combined with other ingredients in various made dishes. In this lesson, however, we shall deal purely with the cooking of eggs themselves as a special food.

Albumen, the most important part of an egg, is said to coagulate or harden at a high temperature

of from 134° F. to 160° F. Therefore it is a mistake to *boil* eggs. There are two ways of cooking what is called "boiled eggs."

1. Place eggs carefully in any saucepan and cover with cold water, and let them heat gradually until boiling point, 212° F., is reached, when they are "soft cooked." If one has no thermometer, watch the water; when big bubbles appear on the surface, the water is at boiling point. Or, you can now let them boil two or three minutes, if liked a little better done. If liked hard cooked, let them cook from forty to forty-five minutes.

2. Place eggs in a saucepan that contains boiling water, but set the saucepan on the back of the stove and keep at about the temperature of 175° F. Let them cook from six to eight minutes, if liked soft cooked; forty to forty-five minutes if liked hard, but do not allow eggs to cook in boiling water over the flame, as this will harden and toughen the albumen. The albumen must cook slowly, and should have a jelly-like appearance when the egg is opened.

Dropped Eggs. If carefully done, eggs cooked in this way are appetizing and attractive. Fill a shallow pan about three-fourths full of boiling salted water, using one teaspoon of salt to one quart of water. Place three or four buttered muffin rings in the water and break each egg separately and slip into each ring. When a sort of film covers the top of the eggs, the white is firm. Serve eggs on buttered toast, slightly seasoned with white pepper, salt and butter. Each person may add more seasoning, if desired. Garnished with parsley, this is a very pretty dish.

There will not be time to cook eggs more than one way, if plenty of time for discussion is given, so I would suggest that the pupils cook eggs as liked — soft cooked or hard cooked, and use dropped eggs for the home lesson.

Have several pupils bring recipes from home, and from different cook books and discuss them.

A school cook book is a fine thing to make. Let every pupil have an opportunity to contribute to this book. The cover design could be made in the Art period, experiments in simple book binding could be made. The recipes could be discussed and read during the Language period, and pupils told to bring in information as to ingredients used.

The development of a nation by its food materials would form an interesting history lesson. The writing period could be used for copying the recipes. The list of cook books available at the Public Library could be placed on the board and boys and girls encouraged to look them over at home. In this way, a valuable amount of information may be brought in while studying the subject of Domestic Science, and an interest aroused in the pupils that will result in the work benefiting the home life.

NOTE

It may be interesting to the boys and girls who go camping to know that an ancient authority in cooking gives the following method for cooking eggs:

"In countries where wood fire is constantly used, the cottager half buries his eggs in an upright position in hot ashes, upon the hearth, and when a clear drop oozes on the top of the shell, the eggs are fit to be eaten."

Order of Lesson

1. Review rule for cooking starchy foods.
2. Introduction of new class of foods, containing proteid or albumen. Proteids come chiefly from the animal kingdom.
3. Write on board list of animal foods: eggs, meat, fish, oysters, clams, lobsters, milk.
4. Care of eggs in household.
5. Tests for fresh eggs discussed and tried.
6. Parts of egg, shell, white and yolk.
7. Importance of balanced diet, consisting of foods from different classes.
8. Combination of starchy foods with proteid foods to be discussed.
9. Cooking of eggs. The teacher, or a pupil, may cook one egg in the wrong way by boiling over the flame. Cook one in the right way. Break open both eggs and compare albumen. Note the jelly-like appearance in the egg that is cooked properly, and the tough appearance of albumen in the other.
10. Recipe explained.
11. Practice work or cooking.
12. Review at the end of the lesson.

OYSTERS

Lesson VII

Salt-water Shell Fish. Mollusks, meaning soft-bodied animals. They have an outside skeleton shell, made from mineral matter, secreted by a thin membrane, called the mantle.

Young oysters float around in water, but as the shell grows it becomes heavy and the oyster settles on the sand. The half shell that forms its bed, becomes deeper than the one that covers it. The two halves of the shell, often called right and left valves, are held together by a large muscle called "the heart."

Pupils bring in several oysters in shells, and class examine them. Notice the blue spot on the inside of each valve — this is the heart.

The mouth is near the hinge of the shell. They have no head nor legs. The only organ for protection seems to be the two muscles with which it opens and shuts its shell — one to take in its food, and the other to guard against danger by closing its shell.

Oysters are found in shallow salt-water along the Eastern coast. The oysters of the Western coast are not as large as those of the East, but there are more varieties and they are of excellent flavor.

The United States leads in the oyster industry. During the spawning season, from May to September, oysters are not considered good, as the eggs are developing.

Composition. Water 88.3%, carbohydrates 3.3%, mineral .9%, fat 1.4%, proteid 6.1%.

Food Value. From the above, you may see that oysters have very little proteid, and a large amount of water. Their food value, however, for invalids and for people requiring a small amount of proteid is very great. Oysters have a fine flavor and are easily digested.

The liver of the oyster contains animal starch,

as they have some carbohydrate matter, which most proteid foods have not. Oysters are not an economical food. In buying oysters for the school classes, it is well to have the dealers open them, but pupils must know how to open them. Place a thin knife under the back end of the cover valve, and cut forward until the muscle gives way that holds the valves together. Then separate the right valve from the left one. One pupil may do this before the class.

They are often sold in bulk, after removal from the shell, by the quart. Sold in the shell by dozens or peck. One quart of oysters should contain about fifty oysters; of course depending upon the size. They are usually found at a short distance from shores.

Nearly all oysters seen in the markets of today are the result of cultivation. They are considered much better than the natural oyster.

Oysters from Chesapeake Bay, from the coast of New Jersey and Long Island Sound, Providence River and Cape Cod, are the favorite Eastern oysters.

Preparation for Cooking. Oysters should be washed and drained on a dry cloth. Lift carefully by gills (not soft part). The oyster liquor is seldom used because so much comes from the oyster while cooking. If it is used, strain before using.

Ways of Serving Oysters. Oysters may be served raw, cooked in the shell, roasted, fried, stewed, served in soup, broiled, pickled, smothered, creamed, fricasseed, sautéd.

To Serve Raw Oysters. In bulk, raw oysters may be

served in the centre of large square blocks of ice, or on soup plates or oyster plates with cracked ice, or in high glasses with catsup (oyster cocktail). Serve with raw oysters, salt, pepper, mace, catsup, celery, horse-radish, vinegar, lemon juice, cabbage and French dressing, crackers, thin slices of bread or bread sticks.

To parboil oysters, or cook them in their liquor, wash and drain them; then put in a saucepan without water, stir or shake gently; when heated sufficiently, a liquor comes from them which keeps them from burning. When edges curl, or the oysters swell to plumpness, they are sufficiently cooked. If cooked too long or at too high a temperature they become tough and leathery.

Creamed Oysters. Make a white sauce as for macaroni and season with salt and pepper, cayenne and celery salt. Use 1 c. sauce to 1 pt. oysters. Serve with toast or bread crumbs browned with butter. When served in patty shells, make sauce thicker.

Oyster Soup — Home Recipe. 1 qt. oysters, 1 pt. milk, 1 tbsp. butter, a tbsp. flour, salt and pepper to taste.

School Recipe. 4 oysters, ¼ c. milk, ½ l. tsp. butter, ½ l. tsp. flour, spk. pepper and salt.

Method. Wash and drain oysters. Strain the liquor and put it on to boil. Remove the scum. When clear, add oysters and simmer until plump, and the edges curl. Strain liquor into milk and put the oysters where they will keep hot but not cook. Melt butter and when it bubbles add flour. Stir mixture until it bubbles, and add milk gradually.

Boil three or four minutes, remove from fire, add the oysters and serve very hot. Oyster stew is made like oyster soup without the thickening.

SUGGESTIONS FOR TEST QUESTIONS

Why do we cook food?
From what sources do we obtain starch?
How could you find out whether a food contained starch?
Describe the effect of hot and of cold water on starch.
Name four starchy foods.
Name four non-starchy foods.
Give the rule for cooking starchy foods.
Give directions for boiling potatoes.
Name the composition of potatoes.
Of what and how is white sauce made?
Name two thickening agents, and give accurately two methods of combining one of them with a liquid to obtain a smooth mixture.
Macaroni, — of what made, and how?
What substance do animal foods contain? Albumen or proteid?
Give general rule for cooking starchy foods in water.
Give general rule for cooking proteid foods in water.
What is the effect of the temperature of boiling water upon proteid foods?
Why is the expression " soft-boiled " eggs incorrect?
What food element or elements is lacking in eggs?
Give three tests for fresh eggs.
Why do we need both starch and proteid in food?

FISH

Lesson VIII

History. In the early settlement of our country, by the Indians and Colonists, places near rivers that contained fish in abundance, seemed to have been selected for homes. We read in Bible history, and in later times in histories of foreign countries, that fish formed the principal article of food. It seems to have been nature's supply of food to primitive peoples. Fish is an inexpensive food, when compared with meat, largely because it is so abundant and there are so many kinds of fish.

Kinds of Fish — Salt Water Fish. Cod, halibut, haddock and mackerel are the principal kinds.

Fresh Water Fish. Brook and lake trout, bass and pickerel.

Food Value. Fish-meat used for food is nearly as important as the flesh of animals and birds. Fish is highly prized as food because it is much easier to digest than meat; although less nourishing, it contains the same elements.

It is an ideal proteid food for people who work indoors because it is easily digested, and contains sufficient proteid for such workers. It is equally adapted to the needs of both young and old.

The parts of the fish used for food are the strips of muscle lying along the backbone on each side from the head to the tail. In white fish this muscle is white, except in herring and mackerel.

White fish is easily digested, as the fat is stored

in the liver, so it requires a sauce and some seasoning — as cod, trout and perch.

The red-blood fish have their fat distributed throughout the body, as in salmon, bluefish, mackerel and herring.

Composition. White-blooded fish — water 78%, proteid 18.1%, fat 2.9%, mineral 1%; Red-blooded fish — water 76%, proteid 16.1%, fat 5.5%, mineral 2.4%.

Pupils notice carefully the amount of proteid — muscle-building food — and decide for themselves what place fish must have in our diet. It is rich in nitrogenous elements — proteid, so it may be used in place of meat, and should be eaten with starchy food — potatoes, rice and bread.

The composition of any food will determine its food value, and place in the diet, according to work of the consumer.

Freshness of Fish. This cannot be too largely overestimated, stale fish being even worse than stale meats. Fish should be eaten in season. Flesh must be firm and elastic to the touch; the gills and eyes very bright, eyes protruding from the head; the tail must not droop. If fish is killed at once on taking from the water the flesh will not become soft.

Cleaning Fish. This may be and usually is done at the fish market, but one fish, at least, must be cleaned before the class, so pupils may know the whole process — and even if done at a market it needs extra cleaning.

Have one pupil go to a fish market the day previous to the fish lesson and see a fish prepared, and have this pupil show class just how the fish men prepared

the fish, then show the additional cleaning in the class.

Begin at the tail, and with a knife work toward the head, then further scaling the fish. Wipe carefully inside and outside with a cloth wet in cold salted water. Be careful to remove any blood near the backbone. If the fish is really fresh it will skin quickly. Do this with a sharp knife, cutting off the strip of skin along the back, loosen the skin from the gills on one side and the skin will come off quickly.

If fish is to be fried or broiled cut off head and tail and split down the back; if to be boiled cut off only the head; if to be baked, leave both on, except when very small fish are used.

How to Cook Fish. Broiling, baking, frying, boiling and stewing are methods used.

Baked fish is a convenient method to use in school cooking.

Baked fish is cooked in its own juices, in a high temperature; to keep the juices inside and to prevent fish from getting too dry, it should be basted frequently with the juices coming from it and with fat that has been added. By thus forming a coating of fat over the surface, more of the juices are retained. This high temperature also causes a browning which adds to the flavor. Baked fish has a stronger flavor than broiled or fried fish. Dry fish needs addition of fat in baking. Haddock, cod, whitefish and bluefish are usually baked whole.

Fish Stuffing—Home Recipe. 1 c. cracker crumbs, 1 s.s. salt, 1 s.s. pepper, 1 tsp. chopped onions, 1 tsp. parsley, 1 tsp. capers, 1 tsp. pickles (chopped), 1 c.

butter (melted), ¼ c. liquid, part butter, part water.

School Recipe. 2 l. tsp. cracker crumbs, spk. salt, spk. pepper, spk. chopped onion, 1 tsp. water or butter melted.

Method. Clean fish and wipe thoroughly with a cloth wrung out of cold water. Make a stuffing of the ingredients above. Place stuffing in cavity and sew up the opening. Rub fish thoroughly with salt and pepper. Butter both sides. Cut gashes across the sides about 2 inches apart, and in these put tiny strips of fat salt pork. Skewer the fish in shape of the letter " S." Dredge with flour. Put on a cheese cloth in a baking-pan with pieces of pork placed on back and sides, and bake, allowing about fifteen minutes to 1 lb. of fish, and basting frequently with liquid from pan. Put a little water with the fat. When well browned, serve with slices of lemon, parsley, and hard boiled eggs for a garnish.

Use a medium-sized fish for each class. A group of girls may prepare the fish and another group attend to the baking. If each girl prepares a small fish, it is much better, as each one then has the complete process. One fish may be allowed for two girls; one prepares the fish and one the stuffing.

Order of Lesson

1. Class of foods to which fish belongs.
2. Anatomy.
3. Nutritive value as seen from composition of fish.
4. Digestibility of fish compared with other proteid foods.
5. Kind of water to use for boiling fish. Hot, at first, to form crust and to harden albumen on outside so that juices are retained in fish. Same principle in baking —very hot oven at first; then reduce temperature and cook through, slowly.

6. Preparation of fish for baking. Steps explained and illustrated.
7. Discuss recipe.
8. Serve with bread or crackers to class, if they like fish.

TENDER MEAT

Lesson IX

Flesh food is called meat. The albumen element in meat is called myosin. It is found in the blood and muscle. This is the proteid or muscle-building element in food, needed to build tissue and to give strength.

Meat contains albuminoids, mineral matter, fat and water.

Albuminous food is more digestible in a raw state, so people with weak or delicate digestive organs may eat raw or rare beef, as beef is the only meat that can be safely eaten in a raw or rare state.

Fat gives heat and force to the body. Mineral matter is in the bones.

Mature animal flesh is called beef, mutton and pork. Calves' meat is known as veal, lambs' as lamb. Beef is the meat of ox, cow and steer. It is the most nutritious meat food, and is most largely used.

Professor Atwater gives the food value of beef and mutton, in the following compositions:

	Water	*Proteid*	*Fat*	*Mineral*
Beef (round)	68.2	20.5	10.1	1.2
Beef (sirloin)	42.2	13.3	43.7	.8
Mutton (leg)	61.8	18.3	19.0	.9

Pupils will find this very interesting and it should lead to comparisons of other meats. This shows the least expensive beef (round) contains more nourishment than the sirloins. The best cuts come from the parts of the animal where muscles are but little used. The meat is finer-grained and more tender, so takes less time to cook. The cheaper cuts are just as nourishing, but take more time for cooking, so that they may digest easily. Tender and tough meat need very different methods of cooking.

The two principles of cooking tender and tough meat must be thoroughly discussed in this lesson, and understood, so that pupils may be able to apply these principles at home.

Principle of tender-meat cookery is intense heat at first to sear the outside and retain juices.

Cuts of beef to which this principle may be applied are: For broiling — use steaks from the loin of beef — short cut, porterhouse and sirloin — loin and rib chops of lamb and mutton.

Hind Quarter of Beef

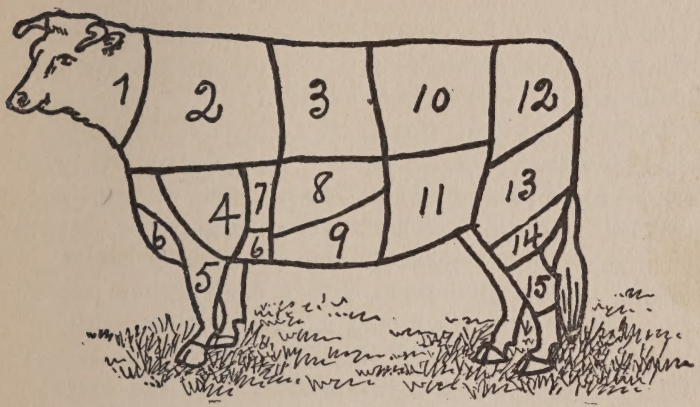
Divisions		*Ways of Cooking*
Flank		Stuffed, corned or boiled.
Round: —	Aitch bone	Beef stew or roast.
	Top	Steaks, good for beef tea.
	Lower part	Hamburg steaks.
	Vein	Steaks.
Rump: —	Back	Best large roasts and steaks.
	Middle	Roasts.
	Face	Roasts and stews.
Loin: —	Tip	Best roasts.
	Middle	Porterhouse and sirloin steaks.
	First cut	Roasts and steaks.
Tenderloin — sold as filet and cut for steaks		Larded and roasted or broiled
Hind Shin		Stew or for soup stock.

Fore Quarter

Five prime ribs	Good roast.
Five chuck ribs	Small steak and stews.
Neck	Hamburg steaks.
Sticking piece	For mince-meat.
Rattleran	Corned for boiling.
Brisket	Best for corning.
Fore skin	Stews and soup stock.

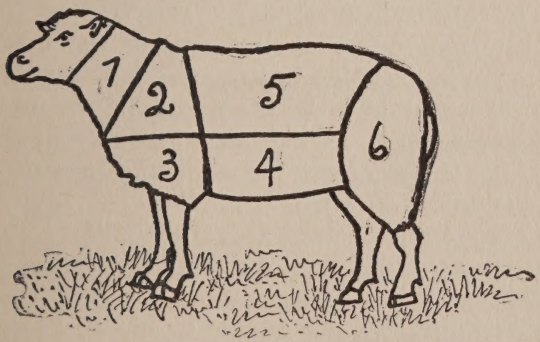
Other Parts of Beef used for Foods

Brain	Stewed or croquette.
Tongue	Boiled or braised.
Heart	Stuffed.
Livers	Broiled.
Kidneys	Stewed.
Tail	Soup.
Tripe	Broiled.



CUTS OF BEEF

1. Neck
2. Chuck
3. Ribs
4. Shoulder
5. Fore shank
6. Brisket
7. Cross ribs
8. Plate
9. Navel
10. Loin
11. Flank
12. Rump
13. Round
14. Second cut round
15. Hind shank



CUTS OF LAMB AND MUTTON

1. Neck
2. Chuck
3. Shoulder
4. Flank
5. Loin
6. Leg

Beef ought to hang and ripen two or three weeks in winter and about two weeks in summer, and should not be eaten as soon as killed.

Ways of Cooking Meat. Roasting and broiling, which develop the finest flavor, should be used only for expensive cuts of meat. The principle of tender-meat cookery is intense heat at first, to sear the outside and retain the juices in the meat. Just before cooking meats, wipe them with a cloth wrung out of cold water. Meats should not be placed directly upon ice, nor should they stand in cold water.

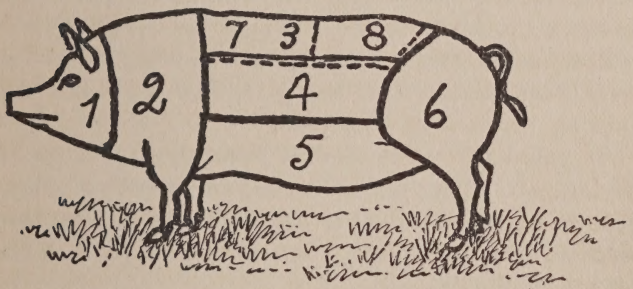
Roasting. For roasting, one must have the oven very hot at first. This will sear the outside. Then turn the roast over and sear the other side. Afterwards, lower the temperature and cook through, or as desired.

Broiling. The principle is the same as in roasting. Sear the outside by having the broiler or pan very hot at first. Sear one side and then the other; turn rapidly for about five minutes. Then reduce the temperature and cook as desired, rare or well done. Should the oven or broiler be cold, the slow warming of the meat would draw out the juices and the meat would become tough. When meat comes from the market, take it out of the paper at once and wipe the outside, but do not wash it.

Boiling Meat. If one desires to retain the juices and nutriment in the meat, put it in boiling water and cook until the outside juices are coagulated; then lower the temperature and cook through. The principle is the same as in roasting and broiling.

The Meat-Cutting Charts given in this book show the animal in section, and the parts used for food.

The best steaks are between the short and hip bone sirloin, as they contain the best part of the tenderloin. They are called both tenderloin and porterhouse steaks. These are the most expensive steaks. Flat-boned sirloin steaks are cut from the rump. The best round steaks are cut from the loin and rump. Steaks may be one inch thick, but are better one and one-half inches thick.



CUTS OF PORK

1. Head
2. Shoulder
3. Back
4. Middle cut
5. Belly
6. Ham
7. Ribs
8. Loin

Either steak or chops may be taken as an application of this lesson. The latter is better where individual work is done, as each girl may have a chop; or one chop for two girls may be used. If the teacher prefers she may have a large steak broiled, or it may be cut in twelve pieces, allowing one piece for two girls in classes of twenty-four. The principle involved is the same as that of tender-meat cookery — intense heat

at first to sear the outside, to retain the juices, and to make the meat tender.

Home Recipe. Meat should be wiped with a cloth which has been wrung out of cold water; and unnecessary fat taken off. Use some of this fat to run over the broiler, so steak will not stick. Broiler or pan must be hissing hot and then greased. Turn steak every five or six seconds at first so outside may be seared and juices will not escape. Steak one inch thick takes about five minutes, if liked rare; seven to eight minutes, if liked well done. Have a hot platter ready to receive the steak, spread all over with butter, then season with a little salt and pepper, serve very hot.

If you have no broiler at home, you can use a frying-pan. This can be heated and steaks or chops placed in it and cooked the same as in the wire broiler. Be very careful that there is no juice in the pan.

School Recipe. For the lesson it is well to use the small saucepans, or small individual spiders; or saucepans for frying may be made to order.

If mutton chops are used, select the rib chops, and cook in the same way as the steak. When thoroughly done, drain on brown paper so that grease will be absorbed; then place on hot platter or hot small plates and serve with wafers or bread and butter.

ORDER OF LESSON

1. Discussion of meat and composition.
2. Ways of cooking.
3. Show on meat chart (beef) cuts.
4. Discuss recipe.

5. Cook.
6. Serve.
7. Wash dishes.
8. Review discussion.

TOUGH MEAT — IRISH STEW

LESSON X

Ways of Cooking Meat in Water: To retain nutriment in the meat, cook in boiling water. To draw nutriment out of the meat, as in soup, put meat into cold water. To retain part of the nutriment in the meat as in a stew, put the bones on the fire in cold water, and when boiling add meat.

Meat, vegetables and fruits may be stewed. Stewing is the best way to cook fruits, for then they keep their shape. Tough meat may be made tender by stewing, while a continued high temperature toughens meat. Stewing is slow steady simmering or cooking in a small quantity of water at a moderate heat for a long time. The word implies slow, moist and gentle heat.

Effect of Different Temperatures on Meat. In stewing, the juices and gelatinous elements in the meats are partly softened and dissolved in the water.

There are three kinds of stews — brown stew, often called ragout or haricot; the white stew, or fricassee, and mixed stews or the Irish stew.

The brown stew is made by browning or sautéing the meat before water is added. White stew is made by putting the meat in cold water and cooking slowly until boiling point (212° F.) is reached.

To thicken stew, remove vegetables when meat is tender and thicken sauce with flour mixed smoothly with water, like a pour batter.

Beef or Irish Stew. Cut meat into small pieces. Add one onion cut in small pieces. Add enough cold water to cover meat. Bring to simmering point. Let it simmer two hours. To the meat add halved or quartered potatoes, a few pieces of carrot and turnip, salt and pepper to taste. Cover and let it boil another hour. Before the potatoes are added to the stew they may be boiled for five minutes to remove the acrid taste. Carrots should be scraped, because the best part is just under the skin, but turnips should be pared.

When dumplings are to be served with the stew, add them when the potatoes are nearly done. The liquid should come up even with the potatoes, so that the dumplings may rest on them. Cover closely to keep in the steam, and cook for about ten minutes.

Dumplings — Home Recipe. 1 pt. flour, 2 tsp. baking powder, 1 tsp. salt; mix with one scant cup of milk into a dough soft enough to handle easily. Pat it out $\frac{1}{2}$ inch thick and cut into small rounds, or mix softer and use $1\frac{1}{2}$ cups milk, and drop by spoonfuls into the boiling stew. Cook ten minutes.

School Recipe. $\frac{1}{4}$ c. flour, $\frac{1}{4}$ tsp. baking powder, $\frac{1}{2}$ s.s. salt, $\frac{1}{4}$ cup milk. Mix and sift dry ingredients and stir milk in quickly. Drop the soft dough from a spoon into the boiling stew and cook 10 minutes.

Notes

For class cut up a small amount of meat into small pieces, cook $\frac{3}{4}$ hour, add vegetables and put on to

cook again. Plan the time for the small stew, cutting the meat and vegetables up very fine so they may have time to cook. The discussion then can be carried on while the meat is cooking. Always plan each lesson with reference to the time required for cooking, allowing time also for serving, washing dishes, etc.

Beef stew ranks first in degree of nourishment. Mutton comes next, then poultry, veal, pork. Corned beef has but little value. It is used to give variety to diet when fresh meats prove too stimulating. The best pieces to corn are rattleran and fancy brisket. The latter has no bones and less fat, and is better than the former.

ORDER OF LESSON

1. Principle of tender-meat cookery.
2. Principle of tough-meat cookery.
3. Compare these.
4. Discussion of recipe.
5. Practice.
6. Cuts used for tough-meat cookery.
7. Review cuts used for tender-meat cookery. (List on board of both kinds of meat.)
8. Review tests for fresh meat and care of meat.
9. Class of foods to which meat belongs.
10. Use of this class of foods in body.
11. Economy in buying different cuts of meat emphasized.

MILK

Lesson XI

Milk is a valuable food as it contains strength-giving, heat-giving and tissue-building properties. It also contains water and mineral matter. Milk is almost a perfect food for a baby, but the elements in milk are not in the right proportions for older people. Its value for older people has been very much over-estimated. Milk that is good is a cream white in color, and not blue on the edges. Milk should cling to the glass.

Composition of Cow's Milk. Water, 87%; proteid casein, 4.3%; milk sugar, 4%; fat, 4%; mineral, 7%.

Goats in Switzerland, sheep in Sweden, Denmark and Norway, give milk. In America Jersey milk is rich and good, although other breeds of cows give nearly as good milk.

A cow must have fresh air, good nourishing food, and hygienic surroundings. She should have a special room for milking. Too much care cannot be expended upon the milk vessels and milk cans; they must be immaculately clean. The milker must have clean hands and clean clothes.

Milk absorbs odors and impurities quickly, and often becomes poisoned, especially for children.

Scalding milk will make it perfectly safe. To scald milk heat it in a double boiler to about 160° F. If you have no thermometer, you can tell pretty well by the small bubbles that appear at the edge of the

milk. Large bubbles indicate boiling point (212° F.). Use the milk when cool. Boiling milk makes it less digestible.

Milk varies with the age and size of the animal, and also with general treatment, viz. — food, surroundings, exercise. Fresh country pasture furnishes the best food. The color of milk is sometimes affected by saffron, madder, rhubarb, cabbage, (yellow) onion, and decayed leaves, and these often give an odor to it. Wormwood in food gives milk a bitter taste.

The quantity of milk also depends on the food of the animal. The state of health of a cow affects the milk, and fresh air and exercise improve its quality. Hygienic surroundings are especially important.

Contamination of Milk — Internal Sources. The milk duct is such that outside dirt may penetrate it and diseases be conveyed into it, — as scarlatina, tuberculosis, diphtheria, fever, tyro-toxicon poisoning (like ptomaine).

External Sources. The cow's body may be coated with dirt or manure. In the stall, light and air is necessary. Dust from hay is a contamination. Cows need special room for milking. Milk vessels or cans should not stand in dirty places and should be scalded before use. Dirt from clothes and hands of milker, and the air, in which there are one hundred different kinds of germs in one quart, contaminate milk.

Contamination is organic, i. e. from solid matter which settles to the bottom of milk and indicates the presence of germs, or from bacteria. There are dairy bacteria in milk and its products. The majority of these are harmless and some of them are useful,

viz. — for ripening of cream, developing of flavor in butter, and in the making of cheese. Others, such as disease germs and poisonous toxins, are harmful and have an injurious effect on milk or on the health of the consumer.

Bacteria cause several different kinds of fermentation in milk. The souring of milk is lactic acid fermentation. Bacteria produce lactic acid from the lactose (milk sugar), and acid coagulates the casein which separates the curd and leaves a liquid residue — the whey. This whey contains the sugar, salts and albumen of milk. There is also a small quantity of a new proteid, produced by decompositions of the casein, called whey-proteid. The curd formed in human milk is more finely divided than in cow's milk, hence it is more digestible.

In feeding children and invalids on cow's milk, the lump condition of the curd may be obviated by addition of lime-water or barley-water to the milk. Souring during thunder-storms is due to the warm humidity which is very favorable to the growth of lactic acid bacilli.

In butyric-acid fermentation, which is caused by about twelve different organisms, the ferment acts as a digester of albumen, which it attacks and gradually dissolves. This ferment produces rancidity in butter. Buttermilk is produced by an alkaline fermentation due to bacteria slow of growth and able to endure a high temperature.

Certain bacteria cause slimy milk in which cream will not rise, nor will the milk churn. Milk of this condition is used in Edam cheese.

Blue milk is caused by lactic acid and other bacilli

(rod-shaped bacteria are called bacilli). It is due to outside contamination and renders the milk alkaline. Blue milk is formed only in the presence of lactic acid.

To Prevent Contamination. Avoid sources of impurity, viz. — uncleanliness of stable, cow, milker, vessels, etc. Avoid conditions favorable to germ growth, viz. — warmth and moisture.

Remedies. The remedies are of four classes: —

a. **Chemical preservatives**, as carbonate of soda, nitre, glycerin, salicylic acid, borax, boric or boracic acid, and formaldehyde. Their effect on the power of digestion is cumulative. Some of them make milk less digestible and nutritious, and may produce dangerous results.

b. **Filtration.** Pass milk through paper or filter presses (not satisfactory) or through sand to remove dirt. Only one-third of the bacteria cells are eliminated but this is considered satisfactory from a mechanical and bacterial standpoint.

c. **Sterilization.** Milk is sterilized at boiling temperature and somewhat decreases the digestibility of milk. It does not kill typhoid bacilli, but a second boiling destroys them. Tuberculosis bacteria are killed at 160° F.; diphtheria bacteria at 140° F.; pneumonia bacteria at 160° F., and cholera bacteria at 140° F.

d. **Pasteurization.** This is sterilization at 75° Centigrade (below boiling point). The milk is then cooled quickly. This process destroys most of the germs and does not affect digestibility as does sterilization at the boiling point.

Adulteration. Water is sometimes added to milk

after cream has been removed. Coloring matters used are caramel, turmene, chalk, saffron. Preservatives used are salt, borax, etc. For thickening after dilution, flour, arrow-root, chalk, sugar and farina are used. Milk should be inspected and tested by chemical means. Legal standards differ in different states.

Special Preparations. — Modified Milk. This is separated into parts and recombined, according to prescription.

Condensed Milk — water 28%, casein 17.2, fat 14.5, lactose 8.7, cane sugar 27.6, mineral 4.0, total 100. The water in milk is evaporated in vacuum pans at moderate temperature and cane sugar added. Some fat has been lost with the water. Condensed milk may be plain or sweetened.

Peptonized milk is milk partly digested.

Pancreatized milk is milk in which the change occurs in the pancreas.

Dessicated milk; the water is evaporated and the residue is used in the form of powder, with water, for infants' food.

Care of Milk. Utensils must be sterilized. Milk should be strained through sterilized cotton, aerated (poured back and forth in air), and cooled after delivery. It should be kept in a cool place tightly covered.

Methods of Transportation. Milk should be transported in large cans or small sealed bottles which should be full and carried in spring wagons to prevent churning. If carried far on the cars it should be kept on ice, then stored in cool places ready for delivery.

Milk as Food. Whole milk (all parts) contains all

elements of nutrition in an easily assimilated form. It contains them in the right proportion for the young but not for the adult, for there is too large a proportion of water and also of proteid for an adult, and too small a proportion of carbohydrates.

Milk for food must have other bulk than water (more solid matter). 1 lb. milk produces $\frac{3}{4}$ oz. dry nitrogenous substance. 1 pt. milk weighs 1 lb. $4\frac{3}{4}$ oz. If 1 lb. is digested and oxidized in the body, it is capable of yielding a force equal to 390 tons raised 1 ft. high. Milk is easily digested by most people. Probably heating milk makes its proteid more indigestible.

Cream is valuable as a food on account of the fat which gives heat to the body. Composition of cream: water 55%, casein 6, fat 36, sugar 3.

Skimmed Milk. As only a part of the fat has been lost, skimmed milk is a valuable food. The composition of skimmed milk is: water 89, casein 4.3, fat .4, sugar 5.5, mineral .8.

Buttermilk, a by-product of milk, is a thin liquid left after butter has been prepared. Composition of buttermilk: water 90, fat .8, mineral 8.4, mineral .8.

General Composition of Milk: water 87, fat 4, mineral .7, proteid 3.4, lactose 4.9. Its nutritive value may be compared with other foods, fibrin, casein, albumen or gluten.

	Beef	Eggs	Milk	Wheat	Oatmeal
Proteid	85	$49\frac{1}{2}$	31	12	17
Fat	10	46	27	1	10
Carbohydrates			36	86	71
Mineral	5	$4\frac{1}{2}$	6	1	2

Two weeks could well be spent upon milk and very valuable information brought in from all sources.

Casein is the proteid part of milk. Casein in milk is made into solid curds by rennet — a substance that is made from the lining of the calf's stomach.

Rennet is sold in two forms — in an alcohol solution called liquid rennet, and in tablets, — made from the powder. This prepared rennet affects milk in the same way as rennet in the stomach, so the curdling of milk by rennet is the first stage of digestion in milk; so rennet custard, often called junket custard, is partly digested milk and is often used for food for invalids and people whose digestive organs are weak.

Rennet or Junket Custard — Home Recipe. 1 tp. milk, 1 rennet tablet dissolved in 1 tbsp. water, 4 tbsp. sugar, 1 tsp. flavoring.

Heat milk until lukewarm, add sugar and flavoring and remove from fire, add tablet dissolved in water, stir slightly and pour out at once into serving dishes. Let it stand undisturbed in warm room or warm water till firm like jelly, then put in a cool place until ready to serve.

School Recipe. 4 tbsp. milk, $\frac{1}{2}$ tsp. sugar, 2 s.s. liquid rennet or $\frac{1}{16}$ of rennet tablet dissolved in 2 s.s. water, 2 drops flavoring — orange, lemon or vanilla. Cinnamon or nutmeg may be sprinkled over the top, or chocolate added.

ORDER OF LESSON

1. Milk.
2. Kingdom.
3. Classes of foods.
4. Milk and Germs.
5. Souring.

6. Favorable conditions.
7. Disease germs — harmless, harmful.
8. Typhoid fever, chief source of germ.
9. Remedy — (absolute cleanliness, cold).
10. Milk as food.
11. Composition.
12. Perfect food for infants, etc.
13. Digestion, rennet.
14. Discussion of rennet.
15. Recipe.

CHEESE

Lesson XII

Cheese is made by heating sweet milk and hardening or "coagulating" it with an acid or rennet into a curd. This is salted, and pressed into cheese.

Cheese is very rich in proteid or nitrogenous food — 31.23%. Cheese is the most condensed form of nourishment, but in a raw state is often difficult to digest. Cheese often takes the place of meat. Used with macaroni the dish may form the principal food of a meal.

As cheese is lacking in starch, it should be eaten with food containing starch — crackers and bread.

Pupils or teachers bring samples of cheese from the grocer. Many varieties may be discussed and pupils can find out to which class of cheese these belong.

Varieties of Cheeses — Whole Milk Cheese. Gloucester cheese is a hard cheese which contains much fat and is good for cooking, especially for Welsh rabbit. Single Gloucester contains only half the cream of the milk. Other varieties include American cheese;

Cheddar, a cheese of a nutty delicious flavor; Dunlop; Cheshire, which looks like Cheddar but is stronger; and Stilton, a choice rich cheese, pale-colored, marked with greenish veins. Parmesan is a skimmed-milk cheese and has a sweet flavor due to fine pasturage on the banks of the river Po. It contains much casein and is a dry cheese. Gruyère is Swiss cheese.

Cream Cheeses. In Edam cheese, the acid is used for curdling, and the outside is colored red. Neufchatel is a rich creamy white cheese. Brie is soft salted French cheese covered with a white mould and then blue or red mould. These moulds come from bacteria in strainers which are never washed. Camembert is a small yellowish cheese covered with a blue mould and white mould. Roquefort is a famous French cheese made from ewe's milk. It is made in layers between which are sometimes sprinkled crumbs of brown bread which have been allowed to develop a species of fungus growth. It is ripened in caves of 41° F. Holes are pierced in the cheese to admit air.

Adulterations. Lard, potato, bean-meal, copper sulphate, coloring matter, saffron, are added.

Composition. Water 30%, proteid 30, fat 35, salts 5.

Nutritive value. Cheese gives a large amount of nourishment in small bulk. Cheese is apt to be indigestible, especially in skim-milk forms, but for men working vigorously in the open air, it is a serviceable diet. It requires thorough mastication to make it digestible. It is more digestible when slightly cooked than when raw. When over cooked it becomes tough and leathery. It is more digestible, when cooked, if a little bi-carbonate of soda is added. Average cheese digests in from 3½ to 4 hours. Cheese

contains all elements needed in the body except carbohydrates.

Cottage Cheese. 1 qt. sour milk, ¼ tsp. salt, 2½ tbsp. butter, sufficient cream to make cheese moist as liked.

Method. Set pan containing milk on back of the stove and heat, or set pan in another pan of hot water. When the curd separates from the whey, drain through a cloth. Squeeze the curd in the cloth until quite dry. Place this in a bowl and mix into a paste with the butter, cream and salt.

Serve in small balls or lightly piled on a dish.

Cottage cheese is quickly made and is a favorite dish for a luncheon.

Cheese Straws. Cheese straws are often served with a salad course.

Make a plain or puff paste, same as for a pie. Mix grated cheese with a few grains of cayenne and salt. Roll the paste about one-fourth inch thick and spread one-half of it with the cheese mixture; fold, pressing edges firmly together, fold again and roll out same thickness. Spread with cheese again and roll again. Do this twice. Then cut in strips four and a half inches long and about one-fourth inch wide. Bake ten minutes in quick oven. Serve.

Cheesed Crackers. These will be nice for the school luncheon, as they are so easily prepared and take very little time.

Crackers of any kind may be used; graham, zephyrettes, or any good crackers sold in the store now, are suitable for cheesed crackers.

For six crackers, use about six tbsp. grated cheese, and a few grains of cayenne.

Butter the crackers and spread with the seasoned cheese, heat and lightly brown in a hot oven.

Cheese Fondue — Home Recipe. 1 c. milk, 1 tbsp. butter, 2 c. cheese (or 1 lb.), 2 eggs, 1 tsp. mustard, 1 c. fine bread crumbs, ½ tsp. salt, ¼ s.s. pepper.

School Recipe. 1 tbsp. milk, 1 level tsp. butter, 1 level tbsp. cheese (grated or chopped), ½ tsp. egg, 1 s.s. salt, spk. pepper, spk. mustard, 1 level tsp. crumbs.

Method. Heat milk and add butter and cheese, stir until both are melted. Add beaten egg, seasoning, and then crumbs. Stir and cook until at consistency of thick cream. Serve on hot toast or crackers. Avoid high temperature because it makes the cheese tough and stringy.

Cheese Soufflé — Home Recipe. 2 tbsp. butter, 3 tbsp. flour, ½ c. scalded milk, ½ tsp. salt, whites of 3 eggs, ¼ c. old English or American cheese, yolks of 3 eggs.

School Recipe. 1 level tsp. butter, 1 level tsp. flour, 1 tbsp. milk, 1 tbsp. cheese, 1 spk. salt, ¼ egg (beaten separately).

Method. Melt butter, add flour, and when well mixed add milk, salt, and pepper. Add cheese and cook until cheese is melted. Remove from fire and add well-beaten yolks. When cool, cut and fold in the beaten white. Turn into a buttered dish and bake in a slow oven 20 minutes.

ORDER OF LESSON

1. Compare cheese and butter.
2. Give composition of each.
3. Find a list of different kinds of cheese, and tell why called by the name given.

4. Discuss nutritive value of cheese and butter.
5. Practice lesson discussed.
6. Make Cheese Fondue or Soufflé.
7. Serve with wafers or bread.
8. Wash dishes.

VEGETABLES

Lesson XIII

A vegetable is a plant or that part of a plant used as a food.

General Group of Vegetables. Green vegetables are made up of stems and leaves. The nutritive value of these is the least of the three groups. They are valuable for salts and acids, and supply food which dilutes, as it were, the more highly concentrated foods.

Starchy vegetables consist of roots, tubers, and fruit of plants, such as sweet potatoes, common potatoes, fruits and corn.

Nitrogenous vegetables, or legumes, are represented by beans, peas and lentils. The nutritive value of these is the greatest of the three groups.

General Composition of Vegetables. Plants contain all the elements found in animal food, but in different proportions and qualities, being as a rule poor in fats and rich in carbohydrates, while their albumen differs largely from animal albumen.

The elements in vegetables are proteids, albuminoids, non-albuminoids or fat (which is very small, except in legumes and corn), carbohydrates (cellulose, starch and sugar), vegetable acids (similar to fruit acids), mineral matter (especially potash and phosphates).

Composition of each Group. Green Group: proteid from 1% to 4%; carbohydrates, starch, sugar, vegetable jelly or pectin; fat; mineral (small); water, 90%.

Starchy group: carbohydrates, especially starch; proteid (small amount); water; potash salts.

Nitrogenous group: protein (large amount); starch; water (less than other groups); fat; mineral.

The different parts of plants used as food are: **tubers**, enlargement of underground stem, as white potatoes, Jerusalem artichokes, yams, etc.; **roots**, as beets, carrots, parsnips, radish, turnip, and salsify; **bulbs**, as onions, garlic, leek, and chives; **stem**, as celery, asparagus, mushrooms, and rhubarb; **leaves**, as spinach, lettuce, cabbage, endive, parsley; **flowers**, as cauliflower; **fruit**, as beans.

Sweet Potato. The sweet potato is a species of the convolvulus family (same as morning glory), and is also commonly called the Spanish potato. The sweet potato appears to have originated in tropical America, but is referred by some to the East Indies, or to both hemispheres. It is widely cultivated in warm climates, and is very successfully grown in the United States. Composition of Sweet Potato: Proteid 1.8%, fat .2%, carbohydrates 27.1%, mineral 1.1%, water 69.3%. Varieties: Vineless, Early Carolinas, Red Rose, Barbadoes, Jersey, Hayman. Yams are like sweet potatoes.

Onions. Onions contain much nitrogenous matter, sugar, water, and a pungent oil rich in sulphur. Varieties of onions: Spanish onion; shallot, stronger in taste, but without the pungent smell of onions; chives, a British variety; Welsh onion or cibol, larger than the chive and more tender; leek.

Garlic belongs to the onion family, but it is a bulb composed of smaller bulbs called "cloves," containing oil of garlic. It is very nutritious. It is supposed to be a blood purifier, stimulates secretions, and is used for nervousness.

Mushrooms. Mushrooms that grow in cups are poisonous. The cups may be under the ground, attached to stem at the base. The poisonous character may also be determined by odor, form, color of spores, and peculiarities of species. When poisonous they are usually highly colored, scaly or spotted; the flesh is tough or watery. So many mushrooms are poisonous that the selection of those used for cooking should be made only by persons familiar with the varieties. Mushrooms form a large part of food of the poor in Southern Europe. They are found in all parts of the world and are usually of very rapid growth. In Italy people send dogs and pigs to root for them. Common mushrooms grow wild in August, September and October. Varieties: St. George Agaric or White Cao, Fairy Ring, Scotch Bonnets, Moret, Truffle. Composition, water 88.1%, proteid 3.5%, carbohydrates 6.8%, fat .4, mineral 1.2; muscarin is the active principle. Mushrooms are rather valuable food. It would require about seven pounds of mushrooms to supply minimum requirements for a day if all were digested, but they are very hard to digest. Muscarin can check action of the heart and cause contraction of pulmonary vessels.

Cabbage. Cabbage is a species of the cruciferæ tribe, introduced into England by the Romans. Composition: Water 90%, proteid 1.5%, mineral 4%, and especially sulphur. As a food, cabbage is very

nourishing. The cabbage family is large and has many varieties: cauliflower, and also a variety of cauliflower known as broccoli; Brussels sprouts which grow as a cluster of leaves, on the stumps of cabbage; Savoy (so-called from Savoy in France), — which is a variety of the common cabbage with a compact head and leaves reticulately wrinkled, — much cultivated for winter use; red cabbage; dark green cabbage; spinach, which is a species of the cabbage family not always so classed. Spinach resembles a variety of the Savoy cabbage. It is a native of Spain.

Lettuce. Lettuce comes from the dandelion family. In certain varieties, it has a cabbage-shaped head. Milky juice of lettuce has in a mild form the medicinal properties of opium. Asparagus belongs to the lily family, not to the lettuce family, and yet it is very closely related thereto. It had its origin by the wild seaside, and it is an English plant. It is commonly used by Americans.

Beans. Beans are a species of legumes and have their origin from Egypt. They are a standard food in China, Japan, India and most of Europe. Varieties: broad or Windsor beans; kidney or haricot; scarlet runner; field or horse bean; chestnut; dwarf or French; locust; and lima bean.

For nutritive value legumes are the most important vegetables except esculent fungi. Commercially they rank next to cereals, but they contain more nitrogenous matter, which in the legumes is legumin, or vegetable casein. They are richer in salts than the cereals. Peas and beans contain sulphur. Legumes are not easily digested unless thoroughly cooked and thoroughly masticated. Composition of beans is:

water, 68.5%; proteid, 7.1%; fat, .7%; carbohydrates or starch, 22%; mineral, 1.7%.

Peas. Peas are a species of legume and had their origin from Greece. Varieties: — garden, eaten before ripe; field, split and made into flour meal, or used in pods for cattle food. Peas are not so nutritious as beans. They not only contain more indigestible matter but they are poorer in fat or proteid. Composition of peas: Water 78.1%, proteid 4.4%, starch 16.1%, cellulose 5.45%, mineral .9%, fat .5%.

Lentils. Lentils come from the legume family and are much the same as peas. Their native country is unknown, but they are now largely cultivated in the region of the Mediterranean Sea, having been used in Egypt and the East from a high antiquity. The leafy stems of the lentils serve as fodder, and when in blossom the plant is a good source of honey.

Care of Vegetables in the House. In winter keep vegetables in cool dry cellar, separate if possible; in summer, use as soon as possible after picking. If canned, never let them stand in tins after opening, for a chemical action takes place when the canned material is in contact with the air. Thoroughly reoxidize before using. The use of copper in canned vegetables may be discovered by their color; they will be a deep green.

Bean Soup — Home Recipe. 3 c. of baked or boiled beans, 3 pts. water, 2 slices of onions, 2 stalks of celery or ¼ cup, 1 tsp. celery salt, 1½ c. of stewed and strained tomatoes, 2 tbsp. butter, 2 tbsp. flour, salt and pepper to taste.

School Recipe. 1 level tbsp. beans, ⅓ c. water, spk.

of onion, spk. of celery salt, 1 tsp. tomatoes strained, ½ tsp. butter, 1 tsp. flour, salt and pepper to taste.

Method. Cook beans, onion, celery 30 minutes, slowly; rub through a strainer and season. Melt butter and when it bubbles add the flour. When this mixture bubbles, add to the soup and cook until thick, like cream.

Notes

Notice first the food value of beans. Remember that they contain all the body needs for nourishment. They are the first vegetables we have studied that contain proteids, and so are classified with the proteid foods, although they contain a large amount of starch. They can be substituted for proteid foods, such as meat. They are much cheaper than meat, but they are not so easily digested, unless they are thoroughly cooked and thoroughly masticated.

Compare food value of peas and beans with other vegetables. Take as much time as possible to go over typical vegetables, under the heads contained in this lesson. The practice work is rather long. It will be necessary to study the food value of beans, and to take a little time to compare beans with peas.

Put the soup on to cook, and while it is cooking go over the lesson. When the soup is done, serve it with wafers, crackers, croutons, or toast. Then wash your dishes and put the kitchen in order.

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DOMESTIC SCIENCE LABORATORY.

COFFEE

Lesson XIV

History. A Paris manuscript mentions the use of coffee in 975 B. C. It was used in Abyssinia and Ethiopia from time immemorial. About 1500 A. D. it was brought to Arabia. The legend of its discovery is as follows. "A poor Arabian dervish noticed evening after evening that his goats returned home in a remarkably happy humor. He watched them closely to find out if possible the cause of their joyfulness, and discovered that they ate largely of the leaves and flowers of a beautiful unknown tree. He tried the effects of them on himself, and was so exhilarated that his neighbors accused him of drinking wine, forbidden to them. But when he told of his discovery, they agreed with him at once that it was a plant sent by Allah as a substitute for the forbidden wine."

Composition of Coffee. An oil called Caffeine is the active principle of coffee. This oil is formed during the roasting, resulting from the action of heat. Coffee has a mixture of several fats; some of these fats are like oil. The amount is affected by roasting.

Value of Coffee. Coffee is a stimulant, usually producing wakefulness; it helps one to endure fatigue, gives heat and there is no depression following the use of coffee. Unlike tea, it does not cause perspiration. It has a slight food value.

As it stimulates the heart action, and the heart is most inactive in the morning, it is a better breakfast than evening drink — except in the case of after-dinner coffee (black), which is so often taken to assist in digesting a full meal.

Tea, coffee and cocoa were introduced into Europe about the same time. Tea was brought by the Dutch from China and cocoa by the Spanish from South America.

Description. The coffee plant belongs to the natural order of Cinchonaceae, the same family as the Peruvian bark from which quinine is made. The botanical name for the plant is coffee arabica. The tree grows about 20 or 30 ft. high, but it is pruned to 6 ft. to facilitate the gathering of the berries. It is an evergreen and the leaves, which spread opposite to each other, are smooth, shiny, oblong and leathery.

It has numerous beautiful, fragrant, white flowers which grow in the axis of the leaf upon short stems. The fruit is red when ripe, resembling the cranberry. In size and shape it resembles a small cherry.

Cultivation. The seeds are planted in nurseries and transplanted when $1\frac{1}{2}$ years old. They are set at intervals of 8 to 10 ft. apart in rows the same distance apart.

Picking. The picking is done largely by women and children. The coffee tree flowers eight months of the year and the fruit is of uneven ripeness. The time of picking depends upon the locality. In Java, it is from January to April; in Ceylon, the chief crop is from April to July with a small crop of young coffee from September to December; in Brazil from April to September.

Roasting. The roasting was once done in the house in an iron pot or over a fire. It was then possible to secure fine freshly-roasted coffee, and more of the aroma was kept. However, on account of the lack of skill and crude appliances, the results were not uniform. Since then the roasting has been done in factories on a large scale in large cylinders, turned by machinery. The first complete roasting and grinding apparatus was used in New York on Wooster Street, opposite Washington Square, and was brought from England by James Wilde in 1833. The apparatus consisted of two cylinders and an engine of sufficient power to run the roaster and a mill for grinding.

Coffee roasting in large quantities. Well seasoned oily solid berries from one to two years old make the best roast. The white beans come from imperfect or immature berries, destitute of flavor because they lack caffeine, and they change little in color during the roasting. The sour berry also harms the roast, as do the shrunken or shrivelled berries, the black bean, and the dead bean.

The process of actual roasting occupies about 1 hr. 45 m., as a rule. From thirty to sixty seconds too long will spoil a roast. Time varies, because New England trade requires a light roast while Western trade requires a dark, full roast. Mocha and other small beans require less time than Java and other large varieties. As a rule, the coffee for restaurants receives a darker roast.

Method. The roasters consist of iron cylinders lowered over the fire. They are perforated to allow the chaff to pass through. There are teeth inside

the cylinders to produce more motion of the coffee. The roasted beans are tested by loss of the horny condition, by samples tasted, and by the aroma given off. During the roasting the coffee loses 16 to 20% of its weight. In bulk it gains 30-5%, and is chestnut brown, for gases have been generated in the development of the aroma (CO and nitrogen) in amount varying with the duration of the roasting. During the roasting also the aroma is developed, the sugar changed to caramel and the caffeine reduced. (See chemical composition.)

After the roasting the coffee is cooled rapidly to prevent its "sweating;" if not cooled it might take fire spontaneously. It is cooled by air forced into banks, by a little cold water thrown into the cylinders, or by being spread on a cold plate of iron. It is then re-sacked and put into packages for shipment.

Grinding. If the berries are too coarse, much boiling is required to extract the strength, but much boiling is fatal to good coffee. The degree of fineness required depends upon the manner in which the drink is prepared. For filtered coffee a fine grind is necessary, for the strength is exhausted by the water that passes through. If brought to a boil, the particles may be larger than the size of a pin-head.

Varieties of Coffee — Mocha or Arabian Coffee. This is supposed to be from Arabia, but the Arabian supply is insufficient and the Arabians are choice of their coffee. It comes mostly from Brazil, East Indies, Africa, and India. There are millions of pounds more of Mocha sold than are raised in Arabia. The berry is small and of acrid flavor. The character of the berry changes when planted in Brazil, so that it re-

sembles Brazil coffee. The infusion from Mocha has a heavier body than that from Java, and has a pungent acrid odor and flavor. It is regarded by connoisseurs as inferior to the best Java.

Java Coffee. This comes from the Island of Java and the Island of Sumatra, which supplies nearly all of the Java used in the United States. It is as good as that from Java, or better. It is raised by the natives under control of the Dutch government. The government buys it all at a low fixed price and it then goes to the Netherlands Trading Company to be sold at public auction. The Java soil is very rich and the berry produced is large and yellowish brown. Varieties: Java, Old Government Java, Sumatra, Celebes, Singapore (Java shipped from Singapore).

Adulteration of Coffee. Dandelion, chicory, turnip, carrots, peas and malt-rye are often used to adulterate coffee.

Simple Test. One can detect chicory adulteration by putting a few grains in the top of water in a glass. If chicory is present, it will soon be enveloped in a yellow brown cloud. This will soon discolor all of the glass.

Pure coffee will not color the water in less time than about fifteen minutes.

Recipes. The most economical way of making coffee is to let the coffee stand for some hours in cold water and bring it to a boil just before using it.

Infused Coffee. Add one cup cold water to 1 tbsp. finely ground coffee in a covered earthenware jar. Stir until all the coffee has been wet. Cover and let it stand three or four hours. Just before needed for use, bring to the boiling-point.

Proceed as in regular coffee-making.

Boiled Coffee. Grind coffee medium fine, rinse coffee pot with hot water and use 1 heaping tbsp. coffee to each cup of boiling water. Stir well together and pour on boiling water; let coffee boil two minutes. Place pot on back of the range where it will not boil, but keep below boiling point for ten minutes. Pour out a little, about ¼ cup, and pour back again. Do this twice and then pour 1 tbsp. cold water down the spout to perfect the settling and clearing; it will be ready for the table in ten minutes. Eggs are not essential to clear coffee; they make a richer coffee and add proteid elements to the coffee, which makes the saying somewhat true, "Coffee is both meat and drink."

Filtered Coffee. Coffee must be very finely ground. Then use one heaping tablespoon coffee to each cup of boiling water. Place coffee in strainer and gradually pour in the boiling water. As it drips, add water until all is added. If liked stronger filter again. This coffee does not boil, but is now ready for the table.

The coffee-pot must be very hot and kept hot while coffee is being filtered. Filtering coffee-pots are sold in all the hardware stores.

If the school laboratory does not contain a filtering coffee-pot, have a pupil bring one and have one pupil make filtered coffee.

Coffee that is boiled too long, or that is left uncovered, develops tannic acid. This acid when used with cream or milk forms a compound that looks like leather, and is very indigestible. This irritates the stomach.

The spout and coffee-pot must be kept perfectly clean. Coffee left after a meal must not be kept in the coffee-pot.

Some of the pupils will like a recipe for boiled coffee when egg is used, as many families prefer this and it is the most economical kind of coffee for everyday use.

Recipe. 1 egg, 6 cups boiling water, 1 cup coffee, 1 cup cold water. Have the coffee-pot perfectly clean and scald it. Beat the egg slightly, add half of the cold water to the egg; then add the shell — which has been washed carefully — mix with the coffee and place all in the pot; add boiling water and mix. Boil rapidly three and a half minutes. Keep flavor in, by stuffing the spout of the coffee-pot with soft paper. Pour out one cup and pour this back into the pot. Do this twice. Add rest of cold water, to clear coffee perfectly. Put on back of the stove where the coffee will keep hot, but *not boil.*

When eggs are dear, keep the shells to clear coffee.

For after-dinner coffee, use twice the amount of coffee, or half the amount of liquid, and serve in after-dinner coffee-cup with cut sugar.

Notes

The legend of the discovery of coffee will add to the interest of the pupils and will impress upon them one physiological effect of the beverage. Some reference to the coffee-houses in London might be made, especially if the class happens to be studying in Literature the work of Swift, Addison, or Steele.

The smallest berries, no matter where grown, re-

ceive the trade name of Mocha and command the highest price. Nineteen-twentieths of the Mochas and Javas of commerce come from Brazil. It is many years since real Mocha has reached Europe or the United States.

Coffee, like most of our foods, is adulterated frequently. The test for pure coffee may be given and applied by the teacher.

Procure from any grocer samples of the different coffees — raw, roasted, and ground. Coffee in the "parchment" and even in the pulp may sometimes be procured from wholesale grocers, who keep them as curiosities. Pictures of the trees and of various stages of manufacture, if they can be found, will add to the interests of the lessons.

The preparation of coffee for market might be illustrated by samples of some of the stages in the process and by pictures if possible.

In making coffee we aim to draw out into the water the caffeine, the oils, etc., but not the tannic acid, which is unwholesome. If time allows, the three methods of making may be mentioned.

Boiled coffee is in most common use, and each child should make a cup of boiled coffee. With an advanced class it would be desirable to illustrate the other two methods, and the teacher might make a small amount of coffee by each of those methods, which the pupils could sample, and compare with that of the boiled coffee.

To reduce expense in the small recipe each pupil may take 1 l. tbsp. coffee and ⅓ c. water. (1 heaping spoonful equals 3 level, or 1 rounding and 1 level.

One rounding spoonful equals 2 level.) This will answer the purpose just as well with but one third of the expense incurred, if each child makes one cup.

If there is not a coffee-pot for each pupil, small granite saucepans may be used. Demonstrate use of coffee percolator. If none is in the laboratory, a member of the class, or the teacher, could bring one from home. One member of the class could show its use, give prices, etc.

WHEAT

Lesson XV

Wheat is often called "The King of Cereals," because it can be raised in a greater variety of soils and climates, and is so much used for bread-making, which is a staple article of food.

Geographical Distribution. Wheat does not grow in damp or extremely cold climates. Dryness and sunshine are necessary to ripen wheat.

It is largely cultivated in the temperate parts of America. Minnesota, the Dakotas, Iowa, Illinois and Wisconsin are the great wheat-growing states. About one-third of our wheat is exported to foreign countries.

Kinds of Wheat. Spring wheat and winter wheat.

Spring wheat is planted in the spring and harvested in the fall. This wheat is common to Minnesota, The Dakotas, Iowa, Wisconsin and Northern Illinois. This is red and hard and makes the best bread flour.

Winter wheat is planted in the fall and harvested in the spring. This is white and rather soft. The flour made from winter wheat is used mostly for pastry. Spring wheat costs a little more than winter wheat, so when wheat is high, the two are often mixed, for making bread, griddle cakes, etc.

Devote one day to the discussion of these grains planted at home. Have the boxes brought in and inspected and discussed during the Nature Study period, at the time when wheat is being studied. All this co-ordination of study is inspiring, helpful and most interesting.

Pupils may send for the United States Bulletin on Wheat, previous to this lesson, and bring it to the reading classes.

Geographical distribution of wheat will prove an interesting subject for the week's Geography and History lessons.

Composition of Wheat	*Proteid*	*Fat*	*Starch*	*Mineral*	*Water*
Winter wheat	10.4	1.0	75.6	.5	12.5
Spring wheat	11.8	1.1	75.	.5	11.6
Graham flour	13.7	2.2	70.3	2.0	11.8
Entire wheat flour	14.2	1.9	70.6	1.2	12.1

From the composition, pupils can note that spring wheat has a little more proteid and less starch than winter wheat.

This table makes interesting studies for pupils who can determine for themselves the food values of articles of daily diet.

Wheat and other cereals too may be grown in the school room. Place in earth, or in sawdust. Pupils may then study sprouting grains. Pupils may also plant different kinds of grains in boxes, at home.

Griddle Cakes — Home Recipe. 1 cup flour, ½ tsp. salt, 1 tsp. baking powder, ¾ cup milk, 1 tsp. butter (melted), 1 egg, if desired.

School Recipe. 3 large tbsp. flour, ½ s.s. salt, 1 s.s. baking powder, 2 tbsp. milk, 1 s.s. butter (melted).

Extra Recipe for Home Use. 2½ cups flour, ½ tsp. salt, 2 cups sour milk, 1¼ tsp. soda, 1 egg.

Method. Mix and sift dry ingredients (flour, salt and soda), add sour milk and eggs well beaten. Drop by spoonsful on a greased hot griddle. Grease with salt pork, as it does not burn and melt, and so penetrates batter. Cook on one side; when puffed full of bubbles and cooked on edges, turn and cook on other side. Serve with butter and maple syrup.

The Department of Agriculture tells us that wheat is rapidly rising in value. In 1840 meat constituted about ½ of the diet of our people, and in 1906, ⅓ of the diet. An insufficient amount of wheat and meal in our diet will reduce the amount of nerve and muscle, and subject the people of our nation to a greater susceptibility to tuberculosis and other diseases.

Batters. A batter is a mixture of flour and milk, or some other liquid, usually with something to make it light or one or more of the following ingredients: butter, salt, eggs, sugar, flavoring, etc.

Kinds of Batters. A pour-batter is a batter which pours in a steady stream. A drop-batter is a thicker batter which does not pour in a steady stream but breaks into drops. A pour-batter proportion is equal parts of flour and liquid; a drop-batter proportion, about twice as much flour as liquid.

Use of ingredients in the batter mixture. Flour is for thickening; salt for seasoning; baking-powder for leavening to make mixture light; milk to make it thin; butter to make it rich and tender; egg to make it rich and light.

Rules for mixing batter. Flour should be sifted

once before measuring. Always mix and sift dry ingredients.

Special rules. Test the heat of the griddle by noting when fat smokes, or put on a "try cake." Grease with pork, and between batches of cakes grease griddle again; also beat batter again.

Make muffin batter from griddle-cake batter. Use twice as much flour to make a drop-batter as for a pour-batter. Mix butter and sugar, and sometimes more egg. To make cake batter from muffin batter, add butter and egg to make richer, and add flavoring.

ORDER OF LESSON

1. Discuss batters and have pupils give definitions of them.
2. Discuss wheat varieties.
3. Recipe to be discussed.
4. Cook.
5. Serve.
6. Wash dishes.
7. Review lesson, if there is time.

FLOUR

LESSON XVI

Flour is made from wheat. Wheat will produce nutritious flour, which contains nearly all the food principles. Wheat produces more flour than any other grain. Wheat flour when mixed with water yields a sticky substance called gluten. This is the nitrogenous part of the flour, and is the nourishing part of the flour when made into bread.

Pekar's method of testing the color is as follows: a sample of flour is compressed into a thin cake or slab, dampened, and then allowed to dry. The depth and character of the color are then observed by comparison with graduated scales of color. The yellow scale is used for high-class flour and the gray scale for low-class flours. The best flours are of a yellowish white.

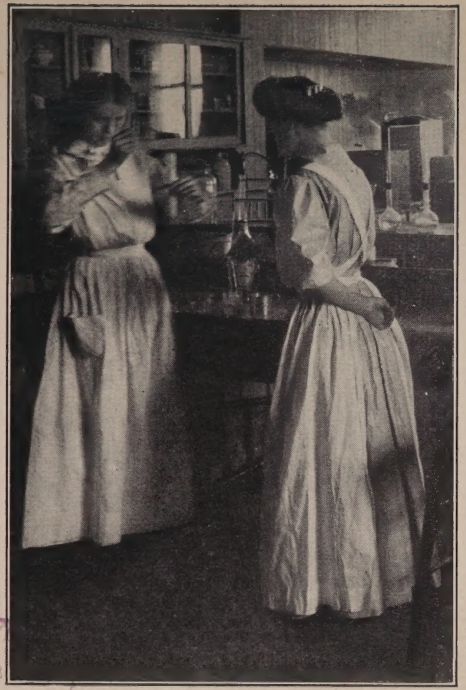
Strength. Strength is the measure of the capacity of flour for producing a bold, large-volumed, well-raised loaf.

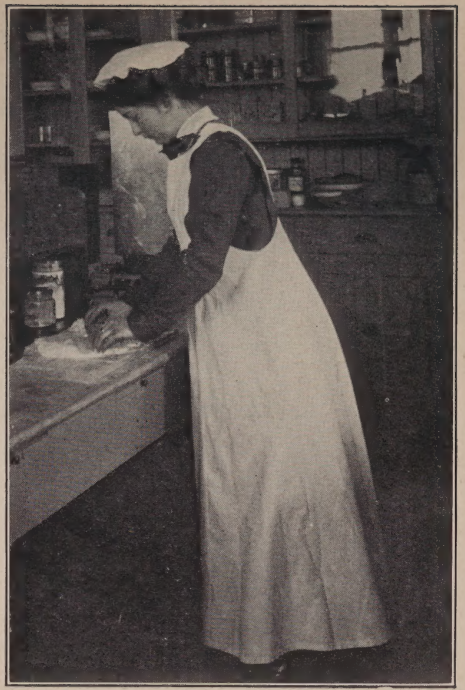
Flavor. This is better tested by the palate than by a chemical analysis. Nutty flavors come from the germ, and sweetness partly from the soluble proteids.

Purchasing Flour. If possible buy the best. Washburn's Extra and Pillsbury's Best are well-known bread flours. St. Louis is the popular brand of winter wheat, or pastry flour. Use bread flours made from spring wheat in all articles that call for yeast. To tell the difference between bread and pastry flours, take a handful of bread flour, close your hand and then open: the flour will not keep any shape, and feels like sugar as it passes through the fingers. Pastry flour taken in the same way retains the impression of the hand, and feels soft.

The proteid element of wheat is called gluten. It has a grayish white color. It is tough and elastic to the touch and is insoluble in water.

Bread should be made from flour that contains the right amount of gluten, because gluten expands and holds the gas developed in the dough by yeast fermentation.





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FLOUR EXPERIMENTS.

A visit to a flour mill is the best demonstration of the process of making flour. This could be made during the weeks the classes are studying wheat; and thus lead up to the flour lesson — muffins, bread, etc.

The best flours are of a yellowish white.

Manufacture of Flour. This is a very complicated process, and the methods change every year, but the principles are — first, cleaning the wheat, and separating the perfect grains from the imperfect ones; second, the grinding, and third, the bolting or process by which the bran is separated from what is called the "middlings" and then the different grades of flour from each other.

Modern methods of milling would be a very interesting topic for the week's reading. These may then be discussed in Domestic Science periods.

Fine flour mills are located at Minneapolis, Minnesota. "The Washburn's Extra" and the "Pillsbury's Best" manufacturers of flour send sample bottles of flour to people wishing to know more about flour and milling processes. Pictures and descriptions of these mills would be valuable in the notebooks pupils should be making.

The processes of flour making would make interesting reading and language lessons for the week that the class takes wheat for a lesson in Domestic Science.

The germ injures the color and affects the keeping qualities of the flour, if it is ground with the wheat.

In these various reductions about 70% of the grain is saved for good and 30% becomes bran and shorts.

Varieties of Flour — Graham. This is often an inferior flour mixed with coarse bran. Strictly speaking, it is made of flour from well cleaned and dusted wheat, ground but not bolted.

Entire Wheat Flour. This contains all the ingredients of the wheat grain, except those of the outer covering.

Gluten Flour. This is made from the outer portions of the endosperm lying near the exterior of the grain. It contains more proteid than the inner portions. The composition of gluten flour is: moisture 13.98%, gluten 54.62, crude fibre .52, proteid 13.3, carbon 17.03, ash or mineral .55.

Adulterations. Beans, peas, rye, barley, rice, are used for adulteration, which may be detected by size and shape of starch grain as seen through a microscope.

Household Suggestions. For small families buy whole wheat by the bag or ½ bbl., Haxall or other bread flour by the barrel, and the best St. Louis flour for pastry by the bag.

Keep flour in a cool dry place, for in dampness it absorbs moisture and the gluten loses its tenacity. Good flour is creamy, yellowish white and when made into a dough is elastic, easily kneaded, and keeps round puffy shape.

Muffins — Home Recipe. 2 c. flour, ½ tsp. salt, 3 tsp. baking powder, 2 tbsp. sugar, 2 tbsp. shortening (melted), 1 egg, 1 c. milk.

School Recipe. 2 level tbsp. flour, ½ tsp. sugar, 1

s.s. baking powder, ½ s.s. salt, ½ tsp. shortening, 1 egg, 1 tbsp. milk.

Method. Mix and sift dry ingredients, mix liquid ingredients and add to the dry. Bake in well greased muffin tins, in a hot oven about 20 m. The recipe may be varied by substituting for half the flour, 1 c. corn meal or 1 c. rye flour. During first half of baking muffins should rise, and in second half should brown and cook thoroughly.

Notes

Pupils may bring in samples of baking-powder and test the smoothness, and also the effervescing powder.

Making notes of comparisons of the different kinds would be interesting.

Baking-powder should not contain more than 14% leavening gas.

If one could mix ingredients carefully, it would be well for families using a small quantity of baking-powder to mix it for themselves.

Weigh 84 parts of soda and 184 parts of cream of tartar. More cream of tartar would give a sour taste and more soda gives a disagreeable flavor and retards digestion. Use a little cornstarch to absorb any moisture.

Cream of Tartar. Is made from the sediment of the best wines.

Cream of tartar has of late years become more expensive and therefore cheap baking-powders have been put upon the market to take its place.

Baking-powder is tested to ascertain the amount of leavening gas. Baking-powder should be smooth; if it is lumpy its reaction has begun.

ORDER OF LESSON

1. See batter notes of last lesson.
2. Proportions for pour-batter and drop-batter.
3. Notice how recipe for drop-batter comes from recipe for pour-batter; observe two ways to make mixture thicker.
4. Make baking-powder experiments.
5. Notice effect of cold water on baking-powder.
6. Notice effect of hot water on baking-powder.
7. Now see the reason why baking-powder makes mixture light.

CAKE — BAKING POWDER

LESSON XVII

Making good cake requires very careful work. By this time pupils have had considerable practice in mixing ingredients, making batters and baking, and should be able to use a recipe intelligently.

Cakes are mixtures of flour, eggs, liquid and sugar.

Cakes may be divided into two classes — those that contain butter and those that do not.

Use only the very best materials for making cake.

Pastry flour is usually used, as it makes a more delicate and better cake than bread flour. If bread flour must be used, a little less is needed — about two tablespoons less for each cup.

There is more starch in pastry flour than in bread flour, therefore the cake will be more tender if made from pastry flour.

Requisites for good cake are:

Perfectly fresh eggs.
Best butter.
Fine granulated sugar.
Pastry flour.

It is always well to try flour before baking a cake. When making a cake from any of the home recipes, try the flour by baking a small cake.

Study each recipe carefully, and now having made batter, pupils should be able to judge for themselves whether the recipe is extravagant or about right, as to amounts of ingredients required.

Cultivating good judgment is one of the results of careful study in Domestic Science work.

A general rule which might be a guide to pupils is — a recipe should call for about half as much liquid as flour, and a little less than one-half as much butter as sugar.

Butter may be considered as liquid, as it melts when baking the cake.

Sweet milk and water will make a cake mixture thinner than molasses and sour milk.

Fruit cake mixtures must be a little stiffer than one without fruit, as fruit tends to make a cake heavy. The fruit sinks to the bottom unless stiff.

Baking-powder is usually the leavening power for cake.

The air in eggs is also a leavener — so the more eggs in a cake, the less baking-powder is needed.

Plain Cake — Home Recipe. ¼ c. butter, ½ c. milk, ⅓ c. sugar, 1½ c. flour, 1 or 2 eggs, ½ tsp. flavoring, 1 tsp. B. P., ⅛ tsp. salt.

School Recipe. 1 tsp. butter, ¼ tsp. B. P., 1 tbsp. sugar, spk. salt, 1 tsp. egg, 3 drops flavoring, 2½ tbsp. flour, 1 tbsp. milk.

Cream the butter, add sugar gradually, and cream with butter; add beaten egg and beat vigorously. Sift flour, salt, and baking-powder together, and alternate with milk in mixture, lastly add flavoring. Beat well. Eggs may be separated, the beaten yolk added after sugar, and the white beaten stiff and added last. Bake in shallow tins about 20 minutes in a hot oven.

Cream of tartar and soda experiments. Add hot water to cream of tartar; add hot water to soda. Turn the two mixtures together and effervescence takes place. Mix one part soda with two parts cream of tartar and add cold water. Slight effervescence takes place. Add hot water to a similar mixture; more effervescence takes place.

Kinds of Cake: a. butter cakes, as pound cake, layer, loaf, fruit, etc.; b. cake without butter, as sponge, jelly roll, and lady fingers, sunshine cake (yolks of eggs), angel cake (whites of eggs). For butter cakes have hot oven. Butter cakes are made light by baking-powder; sponge cakes by air beaten into eggs. Butter cakes are beaten to make them fine grained, while sponge cakes are made tough by hard beating.

Baking. Test for oven: A piece of paper or flour (1 tsp.) turns rich brown color in 5 minutes, when oven is ripe for butter cakes, and light brown in 5 minutes

when ripe for sponge cakes. The thinner the cakes the hotter should be the oven.

Division of time. The time is divided into four quarters: 1, cake should rise; 2, small bubbles appear and cake browns in spots; 3, cake browns all over; 4, cake separates from side of pan and settles.

Test for Cakes. Cake is done if it offers no resistance when pressed with finger or when nothing sticks to a straw inserted in it.

Care of cake when done. Put on cake rack and let air circulate around it. Let angel cake stretch in the pan with pan upside down.

Cake cracks if it rises too fast, or if it contains too much flour. $2\frac{1}{3}$ c. flour (bread) to 3 of pastry, $1\frac{1}{2}$ bread flour to 2 pastry). Cake is coarse grained if the oven is too hot, if there is too much baking-powder, or if it is not creamed enough.

Baking-Powder Biscuit — Home Recipe. 2 c. flour, 1-2 tbsp. shortening (1 butter, 1 lard), 2 tsp. baking powder, $\frac{1}{2}$ tsp. salt, $\frac{3}{4}$ c. milk.

School Recipe. $\frac{1}{4}$ c. flour, $\frac{1}{2}$ s.s. salt, $1\frac{1}{2}$ to 2 tbsp. milk, $\frac{1}{4}$ to 1 tsp. baking-powder, 1 h. tsp. butter.

Mix and sift dry ingredients; cut in the shortening thoroughly with a knife: add milk gradually, beginning to wet from one side. Toss on floured board and pat and cut into biscuit. Bake in a hot oven about 15 m. Top may be moistened with a little milk to form a crisp brown crust. Use as little flour as possible when shaping dough.

Requisites for good biscuit: Handle as little as possible; mix and sift dry ingredients thoroughly; make soft dough; bake in a hot oven.

ORDER OF LESSON

1. Review batter notes.
2. Difference between batters and doughs.
3. Discussion of recipe with demonstration of method of cutting in shortening.
4. Requisites for good biscuit.
5. Practice work.
6. Continuation of baking-powder experiments; or, as this is a short lesson, all of the baking-powder experiments may be done at this time.

GINGER SNAPS

LESSON XVIII

Leavening of the Dough. We use a stiff dough for cookies. For raising dough the proportion is 1 cup of molasses to 1 level tsp. soda. The molasses contains an acetic acid, the same as in vinegar, and the acid and soda neutralize each other, producing bubbles, which expand with the heat of the oven and make the mixtures rise. The molasses, cream of tartar, and sour milk contain acids and may be used with soda, the alkali, to make batters and doughs rise.

Consistency of the mixture. The dough is stiffer than drop-batter, containing more flour and less liquid. It is thicker than batter for baking-powder biscuit. To make it thicker add more flour or less milk. The thinner the dough is rolled the more crisp and snappy the ginger snaps will be.

Baking. All food containing molasses should be baked in a moderate oven, because molasses burns easily. Ginger cookies must be watched very carefully all the time they are baking.

Home Recipe. 1 c. molasses, 1 tbsp. ginger, 1 tsp. soda, ½ tsp. salt, ½ c. shortening, 3½ c. flour.

School Recipe. 2 tsp. molasses, 1 s.s. ginger, ½ s.s. soda, 1 speck of salt, ½ tbsp. shortening, 2¼ tbsp. flour.

Method. Heat the molasses, pour over the shortening, add the dry ingredients after they have been sifted thoroughly, chill thoroughly. This may be done by putting in the ice chest for a short time, or by putting in a cold bowl that has had ice in it. Now toss on a flour board and roll very thin. Use as little flour as is possible, because by using less flour the cookies will be more crisp. Cut with a cooky-cutter and bake in a moderate oven, as they burn easily.

Soft Molasses Ginger Bread — Home Recipe. 1 c. molasses, ⅓ c. butter, 1¾ tsp. soda, ½ c. sour milk, 1 egg, 2 c. flour, 2 tsp. ginger, ½ tsp. salt.

Method. Put batter and molasses into the saucepan and cook until boiling-point is reached. Remove from the fire, add the soda, and beat vigorously. Then add the milk, egg well beaten, and the remaining ingredients mixed and sifted. Bake 15 m. in buttered small pans, having pans two thirds filled with mixture.

Molasses Cookies — Home Recipe. 1 c. molasses, ½ c. shortening, 2½ c. bread flour, 1 tbsp. ginger, 2 tbsp. warm milk, 1 tbsp. soda, 1 tsp. salt.

Method. Heat the molasses to the boiling-point, add the shortening, ginger, soda (dissolved in warm milk), salt and flour. Then proceed as for ginger snaps.

CUSTARD

LESSON XIX

Boiled Custard. Rennet custard is white; it gets this color from the milk. Boiled custard is yellow, from the yolk of the egg. In the rennet custard the rennet thickens the milk; in the boiled custard the egg thickens it. The temperature is lukewarm in the rennet custard because the rennet thickens the milk only at body temperature (70°), and in boiled custard it is not.

Food Value. Boiled custard is a perfect food because it contains all the elements of food principles necessary to the nourishment of the body. The milk contains all the elements. Although it contains no starch it has sugar (milk sugar or lactose), and sugar takes the place of starch, because starch becomes sugar during digestion in the mouth and in the intestines. The other important ingredient is the egg. Egg contains all the elements except the starch, and the lack of starch in the egg is made up by the addition of sugar in the custard. It is easily digested unless over-cooked and curdled.

Suggestions for Custard. Boiled custard is much smoother when only the yolks of the eggs are used. Four or even five eggs to a pint of milk may be used when a rich custard is desired, but three are sufficient for nearly all purposes. Many combinations may be made by adding the whites of the eggs after the custard is poured. Beat the whites stiff and put them

THEORY AND PRACTICE.

A Domestic Science Pupil, in Cooking Uniform, making Ginger Snaps.

in a sieve and cook over steam, or pour boiling water through them. The water will cook and stiffen the egg and, when well drained, it may be piled in rocky form on the custard, or the white may be poached by dipping it by the spoonful in boiling milk.

Serve the custard in a large glass dish and pile the white in a mass, or put spoonfuls of it here and there on the custard with bright-colored jelly on the white. Or serve in small glass cups with the white and jelly on top. The custard may be poured over slices of sponge cake, and covered with meringue of the whites, sweetened and flavored. Floating Island, Flummery, Tipsy Pudding, and hosts of other dishes are only fancy names given to different combinations of cake, boiled custard and meringue.

The following ingredients may be used as flavors: Chocolate, grated cocoanut, or cocoanut cakes crumbled, macaroons (soaked), chopped almonds or any of the varieties of candied fruits, caramel, and lemon or orange jelly cut in cubes. The meringue may be colored pink by beating three tablespoonfuls of bright-colored jelly with the whites, or browned by putting the dish on a board in the oven.

Home Recipe. 1 pt. milk, 3 yolks, 3 tbsp. sugar, ½ tsp. salt, ½ tsp. vanilla.

School Recipe. 1 cup milk, 1 tsp. yolk, speck of salt, 2 level tsp. sugar, ½ s.s. vanilla.

Method. Scald the milk, beat the yolk, add the sugar and salt, and beat well. Pour the hot milk slowly into the egg and, when well mixed, pour all back into the double boiler and stir constantly until smooth and thick like cream. Strain, and when cool add the flavoring. Do not stir the egg into the hot

milk as there is danger of curdling and a part of the egg would be left in the bowl. Scalding the milk hastens the process so that less cooking is required, as well as less stirring. When nearly thick enough the foam on top disappears and the custard coats the spoon. The surest test is the sense of feeling. You are conscious that the custard is thick by the way the spoon goes through it. Do not leave the custard an instant. Watch it all the time it is cooking. Take it off as soon as it is smooth, as it will thicken somewhat on cooling, and curdles quickly if it cooks a moment too long or if it is left in the boiler.

Boiled custard curdles when the albumen is cooked too long, or at too high a temperature. If it curdles beat it with an egg beater. Boiled custard, to be used as a sauce, should be thin enough to boil readily, but when it is to be served as a custard, it should cook a moment longer to make it thicker.

Meringue — Home Recipe. White of one egg, 1 tbsp. pulverized sugar.

School Recipe. 1 rounding tsp. white of egg, 2 s.s. sugar.

Method. Beat white until stiff and dry, add the sugar and beat again.

Baked Custard — Home Recipe. 1 pt. milk, 3 eggs, 3 tbsp. sugar, ½ s.s. salt, ½ tsp. vanilla, a little nutmeg.

School Recipe. ¼ c. milk, ¼ whole egg, 2 level tsp. sugar or 1 tsp. caramel, 1 speck of salt, ½ s.s. vanilla, spk. of nutmeg.

Method. Scald the milk, beat the egg, add the sugar and salt, then the scalded milk, strain, add a little nutmeg and vanilla, and bake about twenty minutes in a deep dish or in cups, set in a pan of

warm water; or steam in a bowl, or in cups. When finished, test with a spoon; if it comes out clear the custard is done.

Caramel Custard — Home Recipe. ½ c. sugar, 2 tbsp. water, 1 pt. milk, 6 eggs, ½ tsp. salt, 1 tsp. vanilla.

Method. Put the sugar in a pan and stir until it melts and is light brown. Add the water and stir it into the warm milk. Beat the egg slightly, add the salt and vanilla and part of the milk; strain into the rest of the milk, and pour into buttered mould. Set the mould into pans of warm water and bake 40 minutes.

Notes

The water may be put into the double boiler and put on to heat at once, and as soon as the milk is measured into the top part of the boiler, that may be put on without waiting for the water to boil. While the milk is heating, the girls may measure the yolk of egg, sugar and salt, and stir them thoroughly. There may be a little time to wait for the milk to heat, but they can be measuring the powdered sugar or the meringue in a separate dish.

The girls who act as housekeepers may beat the yolks at the side table; afterward they may beat the whites. The yolk of an egg contains from two to four teaspoonfuls; a fair allowance will be eight eggs for a class of 24. There will be some white left over. When the milk has a scum, it is ready to be poured on the yolk mixture. When the custard is taken up, it is to be put in a cool place while the pupils are preparing the meringue. It will probably not be con-

venient to wait until cool to add the flavoring, and it is really not necessary. It may be added just before the custard is taken up. We do not usually put flavoring in while the custard is cooking, because heating the flavoring drives away some of its strength, but the amount of heat that comes from the custard after it is removed from the double boiler will not make much difference, and the custard is soon cool. Besides, when the flavoring is stirred in after the custard is cool, the appearance is not improved.

Where the meringue is made, if there is time, it may be cooked over hot water. That makes it dryer and stiffer. We need not take time to do that, but the girls should understand it thoroughly. If the teachers are pressed for time, the meringue may be made before the custard is set aside to cook, as it takes a very short time, and the meringue may be put on without cooking.

ORDER OF LESSON

1. Comparison of rennet and boiled custard.
2. Value of boiled custard as food.
3. Discussion of the recipe.
4. Practice work.
5. Serve the custard with wafers or sponge cake.

SOUPS

Lesson XX

Soup-making as an art seems to belong to the French people.

In the "Early History of Mankind," the author speaks of the people making soup by the primitive process of "stone-boiling," which occupation occupied the larger part of the day.

Each nation seems to have its own favorite soup, but the French nation seems to have placed the art of soup-making upon a professional basis. They use many kinds of liquids, and by adding different flavors, make the soups very palatable and digestible, as well as attractive.

Early history speaks of meat juice as a basis for soup or sauce making.

Modern soups are made from meat juices, vegetables and spices, thickened with flour.

Soups are divided into two great classes — soup with stock and soups without stock, although a third class may be mentioned — fruit soups. Meat soups are all made from soup-stock — this is the soluble part of meat and vegetables dissolved in water.

Soup-Stock. The school laboratory should contain a real soup-kettle — deep with a tight-fitting

cover, so that very little water may be lost by evaporation. This is very important. All meats may be used in making soup-stock, by themselves or used together. When the family is large very little fresh meat need be purchased for stock making.

A little fat should be used in any soup, as a part of it will be absorbed by the soup in cooking and the remainder will rise to the top, and when unbroken preserve the stock. In uncooked meats, use the marrow in the shin.

For White Stock. Veal or chicken.

For Dark Stock. Use beef, browned, and brown the vegetables.

The cheaper cuts of beef are better for soup-making. The under part of the round, neck, flank or shin are full of nutriment, as the life-giving juices are in these parts of the animal. Bones in soup-stock act as a preservative. The gelatine in the bones excludes the air and the stock keeps better.

The bones of chicken and veal are very desirable in making white stock; the gelatine gives body to the soup.

Soups without Stock. These are made from milk, vegetables and fish. These soups are very nutritious and should not be served on the first course of a heavy dinner, but are appropriate for a luncheon, and for children, invalids and old people, as the principal nourishing dish.

Making Soup. The principal points to keep in mind in making soup are first to draw out the soluble juices and flavors into the water, and second to retain that which we have drawn out.

Cold water extracts the juices of meat, as we

learned in the lesson on Tough Meat Cookery, so we use cold water in soup-making.

The meat must be cut into small pieces in order to expose as much surface as is possible to the water. If we use the bones, break them into small pieces. Let this stand an hour, so that the water is colored with the juices of the meat.

Then place the kettle over the fire, let this heat gradually to the boiling point, 212° F., and then skim. Let this now simmer 167° F. for six hours. In no case allow the soup to boil. Cook until meat is in shreds and the juice will all be extracted. Seasoning and vegetables may be added about one hour before meat is cooked. Strain the liquid from the meat and vegetables, and cool quickly.

If you wish to use any of the meat for the meal, heat the mixture to about 170° and take out the meat and cook at simmering point.

Brown soup-stock may be made from dark-colored meats, or the meats may be browned before putting in the water. If this is desired, brown a part of the meat (after cutting in one inch cubes) in the marrow of the bones. Brown in a very hot pan, so the juices of the meat will be retained in the meat.

The pupils will like to have a recipe for standard broth for home use. To make about three pints of standard broth of veal, chicken, beef, mutton:

Recipe. 4 lbs. of meat, with about ½ bone, 4 pints cold water, ¼ of a pepper, 1 to 1½ tsp. salt, 1 to 2 tsp. sweet herbs, 10 pepper corns, 2 tsp. each of carrot, onions and celery, 3 cloves, ½ bay leaf.

Make same as in directions given for soup-stock. Have soup-stock very fresh.

Clear soups are stimulating rather than nourishing. It is a good plan to begin a meal with them, for they are warm, stimulating and easily digested. Cream soups are more nourishing than clear soups.

With soup serve bread in pieces one inch thick and two inches long with crust cut off; croutons, or cubes of stale bread, toasted, with or without butter; lippets, or narrow strips of bread toasted; ginger rolls, milk biscuit, baking-powder biscuit; crackers, plain, toasted, or cheesed.

In soups serve vegetables cut in fancy shapes; macaroni cut in rings; hard-boiled eggs, yolks, or poached eggs in consommé; cheese balls; slices of lemon; bread crumbs soaked in eggs; and barley.

Thickening for Soups. Soups are thickened with flour, cornstarch, or rice flour, 1 tablespoonful for a quart of soup, heaping. Flour is the cheapest, but cornstarch gives a smoother consistency. Mix the flour with a little cold liquid until it is smooth; add liquid until it can be poured easily into the boiled soup. Be sure to boil the soup fifteen or twenty minutes after the thickening is added, in order that there may be no raw taste. Where butter and flour are used, butter may be rubbed to a cream, mixed with the flour, and then made into a paste with a little of the soup. A better way is to put the butter into a small saucepan and when melted and bubbling stir in the flour quickly until smooth. (Be careful not to brown the butter for any white soup.) Then add gradually about one cup of hot soup, letting it boil and thicken as you add the soup. It should be thin enough to pour.

In vegetable soups or purées, as soon as the hot

butter and flour are blended they may be stirred at once into the soup. The hot butter cooks the flour more thoroughly than it can be cooked in any other way. When a brown thickening is desired, as in mock-turtle soup, melt the butter, let it become brown, as it will without burning; then add all the flour at once and stir quickly, so that every particle of it may be moistened in the hot butter. Add the water or soup gradually. Flour that is browned while dry, either in the oven or over the fire, colors but does not thicken. A certain amount of moisture of either fat or water is necessary with the heat to swell thoroughly the grains of starch in the flour. Thickened soups should have about the consistency of good cream. Purées are thicker.

Potato Soup — Home Recipe. 1 pt. milk, 3 potatoes, 1 tbsp. chopped onion, 1 stalk celery, ½ tsp. celery salt, 1 tsp. salt, ½ s.s. pepper (white), ½ tbsp. flour, 1 tbsp. butter.

School Recipe. ¼ c. milk, ¼ potato, 1 spk. chopped onion, 1 small piece of celery (or celery salt), a spk. salt, a spk. pepper, ½ level tsp. flour, ½ level tsp. butter.

Method. Boil and mash the potatoes and heat the milk. Put the celery and onion in milk and cook. Add hot water and seasoning to the mashed potato. Rub the mixture through the strainer, and put it on to boil again. Melt the butter and, when it bubbles, add the flour. When the mixture bubbles, stir it into the boiling soup. Let it boil five minutes and serve very hot. If too thick, add more hot milk. The celery salt may be omitted if you have the fresh celery, or you may put one tablespoonful of fine chopped parsley into the soup just before serving.

ORDER OF LESSON

1. Review the cooking of potatoes.
2. Discussion of the recipe, and easiest way to make the soup in the class.
3. Summary of the recipe may be given by one pupil.
4. Practice work.
5. Serve the soup with wafers, or toasted bread.
6. Review the whole lesson.

STEAMED BROWN BREAD

LESSON XXI

Nature of the Steamer. The steamer consists of two parts, — the outer part, and the inner with holes in the bottom, or just a shelf with holes which fits into the outer dish. The outer dish is put into the water and the steam comes up through the holes into the other part of the dish, taking its heat to the article to be cooked, which is in another dish, upon the shelf of the steamer.

Improvised Steamer. With no regular steamer, put the batter into the tin cup, and put the cup into the small saucepan containing a little water. Cover inner dish. Small steamers may be made to order.

Advantages of Steaming. An article that is cooked over steam cannot burn; it does no harm to let it cook a few minutes after it is done.

Steamed Brown Bread — Home Recipe. 1½ c. rye meal (or white flour), 1½ cups yellow corn meal, 1 c. graham (wheat), 1 tsp. soda, 1 tsp. salt, 1½ c. boiling water, 1 scant cup molasses, 1½ c. milk.

School Recipe. 1 tbsp. wheat flour, 1 tbsp. corn

meal, 1 tbsp. graham (after sifting), 1 s.s. soda, 1 s.s. salt, 1 tsp. water, ¾ tbsp. molasses, 1½ tbsp. milk.

Method. Mix well and sift dry ingredients. Mix all the liquids. Beat together well. Steam three and one-half hours in a covered dish. You may remove the cover when done and dry off in the oven. Take 30 minutes for steaming the small recipe. If you want to use sour milk instead of sweet milk, use 2 tbsp. sour milk instead of 1½ tbsp. sweet. When sweet milk is used, use a s.s. soda to neutralize the molasses, but when sour milk is used less than 1 s.s. will be sufficient. When you consider the amount of soda which will neutralize 2 tsp. molasses and 2 tbsp. sour milk, it requires delicate calculation. Use the small recipe as it stands, as it is very satisfactory.

Test for the Brown Bread. The brown bread is usually done in about thirty minutes. Break a hole in the greased paper, if this is used as covering to the cups, and look at the bread. If not sure, break off a little piece from the edge with a knife or fork, and judge from the appearance of the inside. If moist and doughy, it is not done.

When the brown bread is done, take it out, and let it stand on a saucer to steam off before wrapping it in paper to be taken home.

Notes

Review the composition of graham flour.

A topic that would be profitable, whenever there is an opportunity, is the value of brown bread as food, and its digestibility. Look over the ingredients. Is it lacking in anything? All the food elements are represented and for the most part in a cheap form.

Which would be considered more easily digested — brown bread or white bread? (White bread, because it is softer and more porous, and so is more easily mixed with the digestive juices.)

It takes but a few moments to make the bread batter, but the preparation of the steamer must be allowed for. If the cups just fit into the granite saucepans, use them; if there are no covers to the cups, take small squares of brown wrapping-paper and some strong greased paper and tie around the tops of the cups. When the batter is about ready a small quantity of water may be put on to boil in the small saucepan so that it will be boiled by the time the inner part of the steamer is ready for it. In this practice work cautions for steaming, or instructions about watching an article that is steaming, are needed. As soon as you have your steamer on (with the asbestos mats underneath to keep the dish from upsetting, and to keep the water at a more even boil) you may pack up the dishes.

It is more convenient to finish discussion before washing the dishes for two reasons. The dish-washing will not take the whole half hour and the last part of the half hour will of necessity be more confusing, as the steamers will need more attention than at first. It will be necessary to keep the under dish supplied with boiling water and this will not interfere with the process of dish-washing, though it would disturb the recitation lesson.

ORDER OF LESSON

1. Definition of steaming.
2. Describe steamer.
3. What are the principles of steaming?

4. What precautions are to be taken?
5. Discuss recipe.
6. Practice work.
7. Serve and clean up.
8. Review.

FRUITS

Lesson XXII

Primitive man maintained his existence on fruits and nuts before cooking was used.

Fruit, in botanical language, signifies the seed with its surrounding structures in progress to, or arrived at maturity. Its use in the popular sense is much more limited. The flower, and then the fruit, is formed from a modification of the leaf, and in early stages the fruit is green and exhibits much the same chemical behavior as the leaf.

General Composition. The largest part of fruit is water. Carbohydrates consist of: starch, especially in bananas; glucose; grape sugar in large quantities in nearly all fruits, especially in sweet fruits; cane-sugar in peaches; cellulose in cocoanut, pineapples, nuts. Pectose (insoluble) is contained in unripe fruits; pectin (soluble) in ripe fruits. Pectin forms the main constituent of fruit jellies. Organic acids are both free and combined. Malic acid is in apples; citric acid in lemon and oranges; tartar in grapes. The organic acids are often combined with potash or soda to form acid salts.

Other constituents of fruits are: salts of potash, magnesium, lime, iron, and soda, though less in quantity than in other foods; fat, very little except in nuts; and proteid in a small amount. In ripening

and in cooking the starch becomes sugar and the pectose becomes soluble pectin.

POMACEOUS GROUP, ROSE ORDER

Apples. Apples were known in England before the Conquest. The numerous varieties of cultivated apples have sprung from the wild or crab-apple, — a native of Great Britain. Apples are firmer than most fruits, owing to the greater proportion of cellulose. The presence of malic acid gives them laxative properties, shared also by cider or apple wine. They contain soda, salts. They are rich in pectin and thus readily form a jelly.

Apples should be kept in a very cold place. They keep well in a temperature nearly down to the freezing-point. If one has a good cool cellar, it is economy to buy the winter and spring supply of apples in the autumn when they are cheap.

Pears. The wild pear tree is a native of England. Pears have less acid and cellulose than apples, and a ripe pear should melt in the mouth like a peach. They do not keep so well as apples and are best eaten raw, but they may be preserved in syrup, or sliced and dried in the sun or in ovens, — a practice very common in France. Perry, or pear-wine, is prepared like cider and is similar in properties.

Quinces. The quince is harder than apples and pears and is rarely eaten raw. Stewed with sugar, it may be eaten alone or used as a flavoring for apple pie. Quince marmalade is often made, and the seeds are so rich in mucilaginous substances that they convert from 40 to 50 times their own weight of water into a syrup. Like apples and pears, the quince may be fermented. It is a native of Southern Europe.

ORANGE OR CITRON GROUP

Oranges. All members of this group are characterized by an abundance of free citric acid, notably so the lemon and lime. Since the proportion of water in these is very high they have little nutritive power, being chiefly useful for that purpose in febrile disorders. Sweet oranges are eaten raw; bitter oranges are used for making marmalade, while the rind, rich in oil of orange, is dried and candied. Besides its use in cakes, puddings, and confectionery, orange-peel is a useful stomatic. The white portion underneath the rind is very indigestible, consisting almost entirely of cellulose, so when oranges or lemons are used as flavoring, as in Russian tea or lemonade, the juice alone should be used. The white should be removed, leaving the yellow outer rind with its store of essential oils. Small unripe oranges, known as orange berries, are used in making curacoa.

The orange tree is a native of India but has long been growing in Southern Europe. Orange pulp contains varying quantities of citric acid, citrate of potash and sugar.

Lemons. Lemons resemble oranges but are much more acid, containing as much as 7 to 8% citric acid, besides malic acid, sugar and nitrogenous substances. They are therefore all the more valuable for allaying thirst and for imparting pungency and flavor to tasteless fluids, such as rice and barley water. A spurious lemonade is often made by adding citric acid to water and flavoring with essence of lemon, and this becomes fraud when, instead of citric, tartaric acid and even sulphuric acid are used to give the

acidity. Lemon peel may be candied like that of the orange.

Limes. The lime is smaller than the lemon. The juice is extremely acid, containing 32½ grams of citric acid to the ounce. It is chiefly used in the shape of lime-juice as an antiscorbutic.

GROUP OF STONE FRUITS

These contain a hard stone and fleshy pulp. They vary greatly in size. No other fruit is so apt to irritate the digestive organs, if eaten unripe, over-ripe, or in too large quantities, when colic diarrhoea is the result. They are thus generally used in tarts or made into preserves, only the larger and sweeter sorts being served at the table.

Plums. Varieties of plums are aloe, damson, and green gage. Damsons are more highly prized for preserving than plums, and are also used in damson pies and damson cheese, made like fig cake. A special kind of plum grown in the South of France is even more indigestible and forms, when dried, the mediæval prune. Common prunes are dried plums and are largely used in desserts, stewed and served with cream. They are often useful in removing habitual constipation. The ratio of sugar to free acids in plums is very low, 1.63 to 1, but in damsons 7.03 to 1.

Apricots. Apricots were introduced from Armenia into England under Henry VIII. There are over 20 varieties, the finest are Moorpark Oreda. This fruit does not keep well and is therefore eaten fresh or used as preserves. Some varieties resemble sweet almonds in having a sweet stone.

Peaches. Peaches, of all the common fruits, contain the least amount of sugar, 1.57%, and are therefore useful for diabetic and gouty people. When the stone has been removed, the rest consists almost entirely of juice, since the solids amount to only 1% or 2%. Peaches are esteemed for their juicy tender flesh and their strong but delicate aroma. Like most fruits, they have a laxative action.

The nectarine is a variety of peach, distinguished from it by its smooth skin, whereas the peach is velvety to the touch. Peach brandy is often made in the United States from inferior peaches. Peaches are grown in nearly all the temperate climates.

Almonds. The almond is the type of the botanical class to which peaches belong. There are two kinds, bitter and sweet, — the latter apparently obtained by cultivation. Sweet almonds have a very agreeable taste, and are fairly nutritious, being used in desserts and confectionery. Bitter almonds contain acid, from which is obtained, by a kind of fermentation, essential oil of almonds, and since this contains a little prussic acid, it has to be refined before use. Essential oil of almonds is used for flavoring and in making toilet soaps, as well as medicinally. When almonds are bruised, they often yield nearly half their own weight of a fixed oil, often given to new-born infants like castor-oil.

Cherries. Cherries in this country are eaten fresh, stewed in tarts, or preserved. In France and Germany they form a staple article of food among the charcoal-burners and wood-cutters, entering largely into soup. Cherry brandy is made by mixing brandy with cherry juice. Kirschwasser is a German liquor

made from cherries. Ripe wild cherries are freed from their stalks and bruised without breaking the stone. They are then allowed to ferment and the kernels are broken and thrown in. The whole is then distilled and Kirschwasser is the result. Maraschino is prepared in like fashion from a fine delicately flavored variety, but more care is taken to preserve the flavor, and only the finest sugar is used to sweeten it.

Dates. Dates are the fruit of the date-palm, which flourishes all over the north of Africa and supplies food to millions of people from Morocco to Persia. They rank with grapes as a high-class food-stuff, containing, as they do, 58% sugar and kindred substances. The fruit is eaten fresh or dried, and in the latter state it is made into flour. Solid masses of pounded dates are a familiar sight at a fruiterer's and this is a regular storage form of food for the caravans. Date stones are roasted and used to adulterate coffee, and an oil is often expressed from them when ground, the refuse being used for feeding cattle. Palm wine is made by fermentation of the sap of the date palm. The toddy palm is generally regarded as the wild date. From its sap, by boiling, jaggery or date sugar is obtained in the form of a syrup, four pounds of syrup yielding one pound of sugar. If this liquid be fermented it forms palm wine in the ordinary way, and arrack by distillation.

Olives. The olive is another stone fruit much used, especially in the South of Europe and the East. Pickled olives act as appetizers. The fruits are gathered before being quite ripe and are steeped in lime-water to remove their disagreeable taste, and

then are pickled, in various ways. The taste for pickled olives is an acquired one.

Olive oil occupies the first place among vegetable oils. It is very valuable as food, never gets rancid, does not dry, nor does it freeze at ordinary temperature. It is quite tasteless and might be more largely used in this country than it is, to the exclusion of cod-liver oil. At present it is used chiefly for salad-dressing. The oil is obtained from the lime-seed olive by pressure, the seeds yielding 58% of olive oil. It tends to become cloudy upon long exposure to light, as in a shop window, and it is best kept in the dark. As a household liniment, hot olive oil has no rival. Cotton-seed oil is now largely used as an adulterant, or even as a substitute, for olive oil, and so excessively difficult is it to detect this that the Italian government offered a prize for the best method of doing so.

ACID FRUITS

Grapes. Grapes are probably native to West Asia and the region south of the Caspian Sea, and are grown in France, Germany, South Europe, Australia, etc. With the exception of dates, they exceed all other fruits in amount of sugar, which in ripe grapes is never below 12% and may be as high as 26%. The ratio of sugar to acid in very good grapes is 29.6 to 1, and in ordinary seasons 16.1 to 1; in unripe sour grapes, 10.1 to 1. Even this last ratio is very high and one would expect such a fruit to be sweet, but in unripe grapes the extremely sour juice of the thick skin completely overpowers the sweetness of the grape itself, and in those grapes the juice is always sweeter than the

whole fruit. The acid in grapes is mainly tartaric acid, combined with potash lime and magnesia. When taken in excess grapes act as an aperient.

Raisins. Raisins are dried grapes, and are prepared in two ways. The fruit known as the "Raisin of the Sun," or muscatel, is dried on the growing plant by partially cutting the twig so as to arrest growth. The other method of drying is more elaborate. The grapes are gathered and hung on lines or laid on floors to dry in the sun. When dried they are dipped in a hot lye of barilla soda to which is added a pint of olive oil and $\frac{1}{4}$ lb. of salt for every 4 gallons. After being dipped in this the raisins are drained and exposed to the sun for about a fortnight. They are then pulled from the stalks and packed for export to foreign countries.

Raisins prepared from a small seedless grape, grown in Greece, are called dried currants. The name is a corruption of Corinth.

Gooseberries. Gooseberries grow wild in Great Britain and many parts of Northern Europe. They are successfully cultivated in Northern England. In sweet gooseberries the ratio of sugar to acid may be 6 to 1; in other varieties 4 to 1. Yellow gooseberries contain more soluble matter than the red variety. When eaten freely they repel indigestion.

Cranberries. Cranberries have been said to be so named in Europe because the fruit is ripe in the spring when the cranes return. They are a red acid berry much used for making sauce, etc. The high cranberry or cranberry tree is a species of biburnum and the other is sometimes called the low cranberry or marsh cranberry to distinguish it.

FLESHY FRUITS

Strawberries. One enthusiast says of the strawberry: "Its virtues are legion and it has not a single defect. The gooseberry, like the rose, must be plucked from among thorns; the raspberry soon brings a warning sense of satiety; you may crush your teeth upon a grape-stone, and the biggest and sweetest apple has a core; but the strawberry is one unalloyed and unimpaired mouthful of deliciousness; it has neither rind nor stone to mar the perfect pleasure of the palate and, so healthful is it, that you can eat it until you are tired."

The ratio of sugar to free acid in strawberries is from 2 to 1 up to 6–7 to 1 in the pineapple strawberry. They are richer than most fruits in potash and lime salts, and especially in soda salts. In moderation they are very wholesome and cooling. They have an agreeable aroma and it is said that their flavor is enhanced by the addition of some acid juice, such as orange or lemon juice. After rain, strawberries are comparatively insipid.

Raspberries. In the wild raspberry the ratio of sugar to acid is only 1.8 to 1, but in cultivated varieties it is 3.5 to 1. Its uses are similar to other fruits of this class. Raspberry wine and raspberry vinegar are particularly agreeable and cooling in fevers.

Blackberries. By many the blackberry is considered the finest fruit of this class. Observing what cultivation has done for raspberries, it seems a pity that the blackberry is not taken up more generally by gardeners. It is largely used for making wine, and blackberry jelly is one of the finest jellies made.

Mulberries. Mulberries may be red or black. The

finest kind is the Indian mulberry. It is very refreshing and slightly laxative.

Bananas. The banana is said to be a variety of plantain. Originally it was an Indian fruit, but it was introduced into America shortly after the discovery of the country and now forms a staple article of food. It is reported to yield a greater amount of food-stuff to the acre than any other plant, in this respect excelling the potato in the ratio of 44 to 1, or wheat as 133 to 1; and it has the additional merit of needing little or no attention.

The smaller form of banana is generally eaten raw, or the pulp is pressed into cakes. Plantains are boiled, roasted or baked in their skins like potatoes; or sliced and fried in butter, and powdered with sugar; or the unripe fruit may be ground into meal. This meal may be used to make a beverage like coffee, or fermented into wine. When to these varied uses of the fruit there are added those of the other parts of the tree, it is not easy to name any vegetable which contributes more largely to human needs and comforts.

Pineapple. This fruit has been greatly improved by cultivation. The ordinary pineapple is coarse and fibrous, with little sweetness or flavor, whereas hothouse pineapples are among the most delicate and luscious of fruits.

Breadfruit. The tree is a native of the South Sea Islands, and belongs to the same family as the fig. The fruit is large and has an outer rind, an inner core and a white pulp, — the last being the edible portion. It is cut to pieces and roasted. Though tart, it resembles new bread, the flavor being com-

pared to a crumb of bread with a dash of Jerusalem artichoke.

NUTS

Chestnut. In Italy, the chestnut forms a valuable adjunct to the food supply. It is eaten fresh and there are also three ways of cooking it: "ballotto" (boiled), "arrostito" (roasted), and "teghato." In this last the nuts are shelled, boiled with caraway seeds for flavoring, so that the tree-chestnut flavor is wanting, and then mixed with maize-meal to make polenta. Another delicacy of Italy is "necci," flat baked cakes, made of chestnut-flour and water, without salt, owing no doubt to the tax on that article.

Walnut. The ripe walnut in this country is used in dessert and the unripe fruit is pickled or made into walnut catsup. In France walnuts are much used, just before they are ripe, as a salad with shallot vinegar, salt and pepper. The ripe fruit is one of the best of nuts and on bruising, it yields an oil which is also used as a food.

Hazel Nut. The leading British nut is the hazel, of which cob and filberts are cultivated varieties. A great many nuts are exported annually from Spain and other countries, and are used chiefly for the sake of their oil. Barcelona nuts are kiln-dried before exported and so keep indefinitely. When this is not done, hazel nuts lose their agreeable flavor on keeping and tend to become rancid, unless kept in air-tight vessels.

Cocoanut. Cocoanuts are used both for the food and drink obtained from them. The nuts, both ripe

and unripe, are eaten by natives of the tropics. Each shell has at one end three holes, only one of which can be pierced so as to get at the milk inside. The resemblance of this end to a monkey is said to have given the nut its name, "coco," meaning monkey.

The white or kernel generally consists of nitrogenous material but is indigestible in the highest degree. It contains fully 70% cocoanut oil or cocoa butter, used not only for lighting and lubricating purposes but also as a food. This contains from 60 to 70% of fat, and from 23 to 25% organic matter. It is white in color, has an agreeable taste, and is more digestible than dairy butter, owing to its freedom from acid. It is suitable for cooking and poor people prefer it for all purposes to margarine, while it is about half the price of ordinary butter. The process of making cocoanut butter was discovered by Doctor Schlinck and it is now manufactured from cocoanut marrow by a Mannheim firm.

Value of fruit as a food. Using the term in its restricted and popular sense, it will be seen from the table of analysis that all fruits contain nitrogenous substances and are, so far, tissue-forming, but these are so very small in amount that to sustain the body on fruits alone would demand enormous quantities. Thus, to replace one egg in food value there would be needed more than 1 lb. of cherries, nearly 1½ lb. grapes, 2 lbs. cranberries, fully 2½ lbs. apples or 4 lbs. pears. With respect to their carbohydrates, fruits show more favorably, especially the grape, fig and date, which are rich in sugar. Thus there is 1 lb. starch to 5½ lbs. potatoes, to 5.4 lbs. grapes, to 6.7 lbs.

cherries or apples, to 10.8 lbs. currants, to 12.3 lbs. strawberries. Fruits are, however, chiefly valued for the water and the vegetable acids, free or in combination, upon which depend their valuable properties as blood purifiers, and also for the mineral. Dried fruits, like dried vegetables, are richer in nutriment than when fresh, having a larger proportion of nutrients to given size or amount, but they have not the same refreshing power as the fresh juicy fruit.

With the exception of nuts, the nutritive value of fruits is not great, but as a regulator of the system they are exceedingly valuable. Fruits, when eaten under-ripe or over-ripe, derange the digestive organs. Nearly all fruits are best when allowed to ripen on the tree or vine. Pears are an exception to this. If fruits are to be kept they should be put in a cool dry dark place. It is necessary to examine stored fruits frequently, because decay is contagious. Fresh fruits differ in their effect upon the digestive organs. For most people, pears, apples, plums, and grapes are a laxative, while strawberries have an opposite effect. These properties are much modified by cooking. Unless fruit be ripe enough, and not over-ripe, it is more wholesome when cooked.

The uses of fruit then are: for nourishment, to supply alkalinity of the blood, to re-act on certain secretions of the body, to stimulate appetite, to aid digestion, to furnish a variety in food, and for medicinal purposes.

Cooking Fruits. Fruits are usually stewed or baked. In stewing the fruit loses some of its sugar.

Pears, apples and quince are cut in pieces. Pine-

apples are shredded or sliced. Small fruits are cooked whole. In stewing fruits use half water and half fruit. Put sugar and water in saucepan, and when they boil add the fruit. Hard fruits should be cooked in clear water until soft and then sugar added.

Use of sugar in cooking fruits. Some fruits require very little sugar in cooking, while others are very poor if a good deal is not used. Some of the fruits that require much sugar are strawberries, cranberries, plums, tart apples, currants, and gooseberries. The fruits that are better with a moderate amount of sugar are raspberries, blackberries, peaches, pears, quinces, etc. Nearly all fruits are of better color and flavor and of a more tender texture if the sugar is added when they are first put on to cook. Hard fruits, such as quinces, must be made tender in clear water before the sugar is added. Some fruits will be improved by long cooking, while others would be spoiled by this process. Fruits that will endure long, slow cooking will not as a rule require as much sugar as those that must be cooked quickly.

Cooking of dried fruits. The dried fruits, such as peaches, apricots and apples, if cooked long enough, will require very little sugar. Prunes should never have sugar added to them. Wash all dried fruit carefully and cover generously with cold water. Let it soak over night. In the morning put it on to cook in the water in which it was soaked. Add the sugar, if any is used, and cook slowly two or more hours. The proportion of water and dried fruit is 1 pt. of fruit to 1½ of water. Prunes are better when not soaked. Wash them carefully, then rinse in two more waters. Put them in a stewpan, with 1½ pints

of cold water to each pint of fruit. Let them simmer for 2½ hours. Turn them into a bowl and set away to cool.

Cranberry Sauce — Large Home Recipe. No. 1. Put 3 pts. washed cranberries into a granite stewpan. On the top of them put 3 c. granulated sugar and 3 gills (1½ c.) water. After they begin to boil, cook 10 m. Keep closely covered and do not stir. Remove the scum. They will jelly when cool and the skin will be soft and tender. Some prefer the sauce strained, but of course some of it is wasted by this process.

Home Recipe. No. 2. Make a rich sweet sauce, equal measure of cranberries and sugar, wash, drain, put in porcelain kettle with enough cold water just to show among the berries, when they are pressed down; when they boil add ¼ of the sugar. Sprinkle it over the berries without stirring. Let it boil again a minute. Add another quarter, etc., till all the sugar is in. Boil up once more and turn out. Boil slowly and do not stir. This method is preferred by those who like a very rich sauce. (In giving the large recipe to the pupils, I should give only the former.)

School Recipe. Quarter the amount given and take ¼ c. cranberries, 1½ tbsp. sugar, 1—2 tbsp. water. One tbsp. sauce will be sufficient if a thicker sauce is desired. With 2 tbsp. water there will probably be no need of replenishing the water during the process, as there sometimes is with 1 tbsp. Cranberries should be cooked in granite, not tin, because the acid acts on tin and produces a poisonous product.

Apple Sauce — School Recipe. 1 apple, 2 tbsp. water, 1 level tbsp. sugar, spk. nutmeg.

Method. Wipe, quarter, core, and pare 8 sour

apples; make a syrup by boiling 7 minutes 1 c. of water and 1 c. sugar, with a thin shaving of lemon rind. Remove lemon, add enough apples to cover bottom of same pan, watch carefully during cooking and remove soon as soft, or when all are cooked. Strain the rest of the syrup over the apple sauce.

Notes

If apples are selected, the chemical composition may be given to the class. Water 63.3%, sugar 10.8% proteid 3%, fat 3%, free acids, etc.

The varieties may be named by the pupils and pictures of the different fruits may be shown. They need not be classified except in a very general way. The pupils themselves will probably suggest that lemons and oranges are much alike, and closely related, and also strawberries and raspberries. Other cases in which the resemblance is striking may be mentioned, but this is not necessary and may well be omitted unless there is ample time.

Fruits are not highly nourishing. They are an expensive article as far as nutriment is concerned, for they are not at all concentrated.

Order of Lesson

1. In general. The use of fruit and nuts before cooking, for example in America; meaning of fruit; its connection with seed and flower.

2. Composition. Water, carbohydrates, substance which makes the fruit jelly, acids, mineral salts, fat, proteids.

3. Varieties of fruits.

BACON AND FATS

Lesson XXIII

Kingdom. Fats belong to the animal and vegetable kingdom. The animal fats are meat fats (suets, etc.), lard, oil of fish, cream and butter, cod-liver oil, etc. The vegetable fats are olive oil, cotton-seed oil, oil of fruits, oil of nuts, oil of corn and wheat, etc. The fats belong neither to the starches nor to the proteids, but form a class by themselves. Solid fats are called simply fats, such as butter, meat fats, and lard. Liquid fats are called oils, such as olive oil. Fats are lighter than water, do not dissolve in water, and they make paper waterproof.

Fats possess different degrees of solidity. Those that contain water spoil more readily than those without water. When there is a solid substance in olive oil, the oil has been adulterated with cotton-seed oil, beef suet, or some other oil which hardens at a high temperature. Fats are soluble in hot alcohol, ether, gasoline, benzine, chloroform. They are highly combustible, for they have a strong affinity for oxygen.

Digestion of Fats. In the process of digestion of fats there is no chemical change until they reach the intestines, when they are emulsified and saponified by the action of the bile and pancreatic juice. Cooked fats are more digestible than raw. Butter and cream are the most easily digested forms. Fat should be mixed with other foods.

Uses of fats in the body. They give beauty of form and symmetry, serve as protection, diminish friction, equalize external pressure, give heat and energy to the body, and are stored for future use.

Since fat serves as fuel in the body and gives heat it is better for winter food than for summer food, and better for cold climates than warm. Fats help to form the fat part of the body.

Bacon. Bacon comes from pork, from the sides just over the ribs. It serves as a covering for the ribs.

Serve bacon usually for breakfast, with or without eggs or liver. Bacon that is crisp, crumbly, and brown is better and more attractive than bacon that is flabby.

Recipe. Cut off the rind and smoked part. Slice very thin, cook in hot frying-pan until brown, crisp and dry; or fry in deep fat, drain on paper, and serve very hot.

Notes

Have two girls cook the bacon in the same sauce-pan. Where there are twelve pans in the laboratory, each girl has one slice to prepare and cook.

The practice work in this lesson is very short indeed, so that more time may be given to the discussion. The teacher may prefer to have the practice work and dish-washing first, and then the discussion and notes. The teacher in this case gives just enough of the explanation of the cooking of the bacon to enable the girls to do the cooking well and according to the principle underlying the cooking of fats.

It is not necessary to have the pupils take notes on the discussion in the class, but occasionally, when the discussion is long, it is a good plan to do this.

ORDER OF LESSON

1. Preparation of bacon for cooking.
2. Cooking of bacon.
3. How to keep bacon from being flabby and greasy.
4. Dish-washing.

OMELET

LESSON XXIV

Use of Eggs as a Leavening Agent. Eggs make batters and doughs rich and light. Beating eggs makes the batter and the dough rise. In beating them, air is mixed with them; the air is held in by the sticky albumen of the egg and, when heated, expands or takes up more room, so that it pushes the mixture up or makes it rise. Watch an omelet rise while it is cooking.

After beating the yolks and whites for an omelet stir them together or cut and fold them in. Beating them would break the bubbles of air that have been beaten in. Beat separately, so that more air can be beaten into the eggs and especially into the whites alone. We call an omelet a foamy omelet when this has been done, because it is more frothy or full of air than if the whites had been beaten with the yolks. If, in separating, even a small part of the yolks gets into the whites, they cannot be beaten so stiff. To open an egg make a hole at one end and let the white run out first; or, crack it around the center and break

the shell in two, letting the white run out and keeping the yolk in one piece of the shell.

The yolks should be beaten until they are light-colored, and creamy or thick. The whites are beaten enough when they are so stiff that they do not run out when the bowl is tipped. Put liquid and seasoning into the yolks. If it is put into the whites it would break some of the air bubbles that have been beaten into them.

Cut and fold until the two parts are mixed. The less mixing the better, or the mixture will become more liquid and less frothy, and the omelet will not rise so well.

The pan is at the right temperature for cooking the omelet when the butter melts and bubbles without browning. The butter called for in the recipe is not to be put into the omelet, but into the pan, and is to be rubbed around the inside to keep the omelet from sticking.

The pan will be getting hotter all the time, so the gas should be turned lower when the omelet is put into the pan. Let it cook gradually through; it should rise first, then cook and become brown. If the temperature is just right, the mass of the omelet should be below 75°. The upper part cannot rise above the boiling-point until the water is dried out. If the pan is too hot the omelet will burn on the bottom while it is still raw on the top and on the inside, and the bubbles of air will expand too fast and burst so that the omelet will fall. If the pan is not hot enough, the omelet will be tough and unattractive.

The omelet is done when it has risen, is slightly brown on the bottom and is firm. The top part will

be a little raw, so if there is any objection to that, it can be dried off in the oven, in the pan, before it is folded over. The omelet may fall if the oven is too hot. Another way to dry off the top is to put a hot cover over the omelet in the pan before folding. Fold it over like a pocket-book and turn it out on a hot platter.

When the yolks and whites are not beaten separately, it is called a creamy omelet. Other kinds of omelet are cheese omelet, parsley omelet, etc. The foundation is the same in every case, and the omelet is named for any ingredient that may be added. This ingredient may be added to the omelet when it is in the pan and all done but not folded over, or it may be added before the whites, but this is not done unless the ingredient needs to be warmed with the omelet, as in the case of cold chopped meats.

Sweet omelets are used as desserts. A sweet omelet may be sprinkled with powdered sugar and seared with a red-hot iron. Hot water is used often because it makes the egg more tender and so it is better than milk. In orange omelet the orange juice may be used in place of water for flavoring.

Foamy Omelet — Home Recipe. 4 eggs, ½ tsp. salt, ½ s.s. pepper, 4 tbsp. milk, 1 tbsp. butter.

School Recipe. 1 egg, ½ s.s. salt, spk. of pepper, 1 tbsp. hot water, ½ or ½ tsp. butter.

Method. Beat the yolks light-colored and creamy; add seasoning and liquid. Beat the whites till stiff, and cut and fold them very carefully into the yolk mixtures. Butter the sides and bottom of a smooth iron pan; when the butter is melted, but not brown, turn in the omelet and spread it evenly in the pan.

Cook over moderate heat. When the omelet is well puffed up, firm and delicate brown underneath, fold over and turn out on a hot platter. It may be dried off in the oven or by putting a hot cover over the pan.

Notes

For omelet select large eggs, always allowing one egg for each person, and one tbsp. liquid for each egg.

An omelet-pan should be kept especially for making omelets and used for no other purpose. It must be kept very clean and smooth. In the Domestic Science laboratories a frying-pan may be used in place of an omelet-pan. In this lesson each girl should have one pan, and make her own omelet.

Take up the discussion of eggs in review as to the kingdom to which they belong, and name the parts of the egg, care of eggs, tests for fresh eggs, temperature for cooking eggs in water, and why.

Two girls may make one omelet together according to the individual recipe. Either one of the two may open the egg. The first girl may then make the omelet, up to putting it in the pan, and the second girl may take care of it in the pan until it is ready to serve. Each must watch whatever her partner is doing and understand the whole process thoroughly.

SPONGE CAKE

LESSON XXV

This lesson is based directly upon the last one. The same principle governs the manipulation, and the same reasons apply for each step in the process.

Sponge Cake — Home Recipe. 4 eggs (3 or 5 may

be used), 1 cup fine granulated sugar or powdered sugar, ½ lemon, juice and rind (grated), ¼ s.s. salt, 1 cup pastry flour.

School Recipe. ½ egg (yolk and white separated), 1⅓ level tbsp. sugar (1 tbsp. plus 1 tsp.), 1½ s.s. lemon juice, ¼ s.s. salt, 1⅓ level tbsp. flour, 1½ s.s. cold water.

Method. Beat yolks till light color and thick; add sugar and beat together. Add lemon juice, water and salt. Beat whites to a stiff froth, and cut and fold them into the yolk mixture. Cut and fold in the flour. Bake in moderate oven for from 30 to 45 minutes.

Frosting — Home Recipe. 2 tbsp. liquid (water, fruit juice, or sweet cream), stirred thick enough with XXXX sugar to spread on the cake.

School Recipe. 5 s.s. water, 2 drops lemon and the sugar. Method the same.

Be careful to beat as much air as possible into the eggs, and then to mix in such a way that the air will be kept in. After the yolks and whites have been beaten separately, add the other ingredients to the yolks, because if they are added to the whites some of the air bubbles would break, and the cake would not rise as it should. Yolks and sugar should be thoroughly mixed, or the cake will be coarse-grained. Vanilla may not be substituted for lemon juice, which is used not only as a flavoring but because its acid makes the albumen of the egg tender. There is a large amount of egg in sponge cake compared to the amount of flour. Cream of tartar may be used as the acid.

Practice Work

The preliminary discussion should be as short as possible, as the practice work is longer than in some

lessons, and time must be allowed for slow baking of the cake in a moderate oven. Each girl works alone, using one half of an egg, but in dividing the eggs work in groups of two. Either girl in the group may open the egg, separating the yolk and white; the first girl in the group may beat the white and the second the yolk. After the yolks are beaten, they may be divided equally between the girls. There are two teaspoonfuls of yolk in an average egg before beating, and there will be more than this after beating, so the two girls should see that the beaten yolks are evenly divided. Each will take one teaspoonful and divide what is left. The whites are easily divided. After they are beaten stiff in the bowl, cut across with a knife or spoon and divide thus. The lemon juice is to be strained and ready to use. If the oven is too hot the bubbles of air will expand too fast, so that the cake will fall. If the oven is hot enough to form a crust before rising, the bubbles of air cannot push the cake up, so the albumen becomes hard and cannot stretch and cannot rise. Therefore, the cake should rise at first before it browns.

Division of the time of baking. First quarter, the cake rises; second quarter, little bubbles form and the cake browns in spots; third quarter, it browns all over; fourth quarter, it separates from sides of the pan, and settles.

When the cake comes from the oven, turn the pan over, raise it from the table, and let the cake steam or stretch out. The cake is very delicate when it first comes from the oven, and if this is done it will stretch instead of settle.

Review two divisions of cakes — Cakes without butter. Sponge cake (jelly roll and lady fingers); sunshine cake (yolk); angel cake (white).

Butter Cakes. Pound cake, layer cake, loaf cake, doughnuts, gingerbread, fruit cake, and cookies (all varieties from the same foundation).

The sponge cake is more easily digested, as it is apt to be more porous and mixes with the digestive juices of the stomach. The richer butter cakes are not so easily digested. The sponge cakes are healthful because of the large proportion of egg. Sponge cake is harder to bake because albumen is sensitive to heat.

Some sponge cake recipes call for one cup of hot water. This is not real sponge cake, for the liquid thins the albumen so much that it cannot stretch, and the egg alone cannot make the cake rise sufficiently. In this cake baking-powder must be used.

ORDER OF LESSON

1. Short discussion of batters.
2. Discuss recipe.
3. Practical work.
4. Serve cake.
5. Wash dishes.

ICE-CREAM

LESSON XXVI

The kinds of frozen mixtures are: Philadelphia ice-cream, made from pure cream; Delmonico or New York cream, made from custard and cream; frozen custards, made of custard, cream and fruit; Nesselrode pudding, which consists of ice-cream and chestnuts; mousse, which is frozen Charlotte Russe, or Bavarian cream not stirred, generally made with

gelatine; cream parfait, whipped and frozen without gelatine; tutti-frutti, frozen ice-cream with fruit and wine; meringue-glacé, cream of boiled syrup and white of egg baked; ice-cream and meringue baked; sultana, made of pistachio ice-cream and sultana raisins with whipped cream in center, and claret sauce over it; Neapolitan cream, a mixture of different kinds of layers; biscuit glacé, cream frozen in paper cases.

Sherbet and water ices are made with the juice of fruit, water and sugar. A tablespoon of gelatine soaked and dissolved, gives a light and smooth consistency to water ices. Many people prefer to boil the water and sugar to a syrup, remove the scum, and when cool add the fruit juice and then use the white of an egg beaten stiff, adding it after the sherbet is perfectly frozen.

Shaved ice is often put in coffee or in fruit juice, or lemon ice in fruit juice.

Principle of Freezing Cream. Ice and salt make a freezing mixture; the salt melts the ice and the ice dissolves the salt and makes a mixture that has a temperature below freezing-point of water. On packing the ice and salt around a liquid, they draw the heat, and the liquid freezes. Therefore salt and ice are used to freeze ice-cream.

Pupils may fill a bowl with small pieces of ice. Test with the thermometer, to see how cold it is. Now put in three or four tablespoons of rock-salt and note the temperature.

Freezing Cream. Have ice finely crushed. This is best done by putting the ice into a coffee-sack and pound. Always use rock salt. After cream is

in the can, fill the space between the can and outside pail with alternate layers of salt and ice. The proportion is three times as much ice as salt. Begin with the ice and let the packing come up a little above the cream in the can. The larger the proportion of ice, the slower the cream will freeze, and the smoother and finer grained the ice-cream will be. The cream inside the can will expand in freezing, so the can should not be more than about two-thirds full. Begin freezing the cream by turning the crank slowly at first and more rapidly as freezing proceeds. From twenty to thirty minutes is required to freeze cream. You will know by the dasher when the cream is frozen, as it will turn hard. Take out the dasher, and be careful in wiping the outside of the cover and can, that no salt water gets into the cream.

With a knife scrape the cream from the sides of the can and pack it closely. Place a cork in the hole in the cover. The salt water must drain off. Repack with ice and salt. Cover with a bag or a piece of old carpet.

The flavor of cream is much better if the cream stands packed for about an hour after freezing. Freezer must be thoroughly washed and scalded before putting away.

A good substitute for a freezer is a deep can or a tin pail, packed in a wooden pail. If a pail is used whirl the pail around by the handle. Take off the cover every little while and beat the cream.

Water-ices are frozen like cream but the crank need not be turned all the time.

Mixtures that are to be moulded and frozen must

be packed solidly in the mould about three-quarters of an inch thick, and frozen, using four parts ice to one part salt.

For freezing frappé use equal parts of salt and ice.

Philadelphia Ice-Cream. This is a very choice ice-cream and is better made of thin cream. The cream may or may not be scalded, according to the individual taste. Scalding or cooking the cream for ice-cream prevents it from curdling and makes a fine-grained ice that will cut like jelly.

If cream is not cooked, it expands more in freezing and makes more cream, but tastes a little raw. Use a double boiler, if the cream is scalded, or a pail set in a sauce-pan of hot water will do. The scalding point is reached when small bubbles appear at the edge of the milk next to the pail.

1 quart of thin cream, 1c. of sugar, 1½ tbsp. vanilla.

Method. Scald the cream and then dissolve sugar in it. When cold add the flavoring and freeze.

Vanilla Ice-Cream — Home Recipe. 3 c. scalded milk, 2 eggs, 1½ tbsp. flour, ½ tsp. salt, 1½c. sugar, 3 pts. thin cream, 3 tbsp. vanilla.

Mix salt, sugar and flour, then add the eggs, beaten slightly, cook in double boiler twenty-five minutes. At first stir constantly. When cool add cream and flavoring, strain and freeze.

Neapolitan Cream. Is made of cream of very rich milk and eggs. Usually only the yolks of eggs are used. Sometimes made of two kinds of ice-cream, and an ice frozen in a mould. 1 quart cream or rich milk, 8 eggs (yolks), 1½ c. sugar or more if liked sweet, 1 tbsp. flavoring.

Method. Beat eggs until thick, add the sugar

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and beat. Put this mixture with the cream into the double boiler and cook as in boiled custard. Strain into a dish and set in cold water. When very cold, flavor and freeze.

Frozen pudding is made of either Philadelphia or Neapolitan cream. It is often mixed with nuts and fruit and frozen in moulds lined with lady fingers.

In making fruit cream, — mash the fruit, mix with sugar and let stand an hour before mixing with the cream.

Water Ices. Are made of sugar or syrup and fruit juices. Ice sherbets are best known. Lemon juice is added to a quart of syrup to bring out the flavor. Delicious sherbets may be used by simply using fruit juices and sugar. Stir sugar into fruit juices and freeze. Freeze slowly, beat twice during the freezing, pack ice and let stand two hours.

Chocolate Ice-Cream. Make a vanilla cream; melt four ounces of sweet chocolate over a kettle and stir in a little hot cream, or hot water, and add to the vanilla cream. Strain and freeze.

Coffee Ice-Cream. 1 quart cream, 2 c. milk, $\frac{1}{4}$ c. strong Mocha coffee, 2 c. sugar, $\frac{1}{2}$ tsp. salt, yolks of three eggs.

Method. Scald milk, and coffee and sugar, beat eggs slightly and add $\frac{1}{2}$ c. sugar and the salt. Put in double boiler and cook like boiled custard. Add 1 c. cream and stand in a warm place for 30 minutes; cool and add rest of cream. Strain and freeze.

Pineapple Sherbet. 1 can grated, or 1 pt. fresh fruit, 1 pt. sugar, 1 pt. water, and 1 tbsp. gelatine.

Method. Soak the gelatine in a little of the water, cold, and dissolve it in the rest of the water, boiling.

When dissolved, add the sugar and fruit and strain. Freeze.

School Recipe. ¼ c. cream, 2 l. tbsp. sugar, 3 drops vanilla. Dissolve sugar in cream and add flavoring; as it freezes scrape from the sides of the cup; shake. If chocolate is used, scald some of the cream with it and use more sugar. The cream may be whipped, or white of egg added.

Notes

When the individual recipe is used, the pupil may use for a freezer a saucepan and a tin cup with a handle. Put ice-cream in the cup, and pack ice and salt around the cup in the saucepan. Move the cup constantly by the handle, as in turning a freezer.

There should be a freezer in the laboratory; it should be a part of the lesson to explain the parts of the freezer and its use, even if the work is done individually.

If the teacher prefers to use the freezer and not the individual freezer, there are two ways: a. Make the ice-cream from custard by group work, having about three groups, and have each group make ⅓ of the large recipes, or ⅓ of the amount the freezer holds. The work could be assigned to the members of each group, according to way pupils are seated in the laboratory. b. The individual method is much the better way, as it gives each pupil an opportunity to do all parts of the work. The group method is less expensive. The small recipe could be frozen in small freezers made to order.

The large freezer could be used sometimes during the year when pupils serve luncheons, dinners, etc.,

and then, if the individual freezers are used for the lesson, the pupils will understand how to make a substitute for a freezer, if they have no regular freezer at home.

A regular ice-cream lesson would be better than one lesson on water ice. Serve simple cake or wafers with cream.

ORDER OF LESSON

1. Difference between ice cream and sherbets or water ices. Kinds of ice cream made from cream or from custard of milk, eggs and sugar. If this is an advanced class, other kinds of mixtures might be spoken of.
2. Parts of freezer. Outside, can and dasher; space between for packing of ice and salt.
3. Proportion of ice and salt.
4. Packing the freezer.
5. Turning the freezer.
6. Kinds of freezers sold in stores.

BREAD

LESSON XXVII

History of Bread. We find in the Bible and in ancient histories, passages that indicate that bread has been a staple article of food from time immemorial.

In ancient times bread was made from plants and grains — barley, rye and millet. In modern times we have learned that wheat is the grain that most

nearly contains the right proportions of gluten — the proteid part of wheat — to make good bread.

In old times the bread was made thin so that, in baking, the heat could easily penetrate the dough.

Although modern cooks have every opportunity to understand the art of bread-making, good bread is found on the table in but few American homes. This may be accounted for in several ways — first of all perhaps because the modern home-maker is not willing to devote as much time as is necessary to the making of a perfect loaf of bread, for it does take *time*, and an intelligent knowledge of cooking. One must understand thoroughly the chemistry of bread-making and be able to apply the principles in a practical way but it is worth while, as the subject admits of a wide range in the application of food principle and the ability to make good wholesome bread is an accomplishment any woman may be proud to possess, for a food that is so universally eaten as bread must be nutritious and digestible.

Materials. Flour, yeast, salt and liquid are the ingredients necessary to make a loaf of bread.

Wheat flour makes the best bread, as it contains gluten in the right proportion to make bread light, for the dough will keep the gas formed in it by the yeast. Wheat flour also produces bread that contains starch in a digestible form. Wheat flour contains very little fat, so we supply this absence of fat by spreading bread with butter. Rye flour ranks next to wheat flour in nourishment, but should be used with wheat flour in bread-making, as it is sticky and moist and also makes a heavy bread. Corn mixed with wheat makes good bread.

Having had the study of flour in the lesson on wheat and flour, we know the composition of bread flour — spring wheat flour.

Yeast. Yeast in number of organisms is a very low form of vegetable life. These organisms are produced by cultivation. Under favorable conditions these organisms grow and cause fermentation. These organisms are killed at 212° F. The temperature most favorable to growth of yeast organisms is body temperature or from 65° to 70° F.

Bread dough, leavened by yeast, causes alcoholic fermentation — the kind we want to make our bread rise and not sour. Bread sours because alcoholic fermentation goes on too long.

Milk sours when lactic fermentation occurs.

Yeast, as we buy it in the stores in a compressed form, contains a number of yeast plants pressed together, confined in a covering which prevents growth. Pupils examine a cake of compressed yeast and notice the covering of tinfoil — these cakes should always be used *fresh*.

Most modern housekeepers use compressed yeast — it is convenient and satisfactory if perfectly fresh, but many women prefer the liquid yeast, which they are willing to make, believing the bread to be sweeter and more wholesome.

Compressed yeast is a by-product in the making of whiskey. It would be interesting to have pupils see yeast made if a local plant is accessible. Pupils may bring information on the manufacture of compressed yeast into the class during one of the three periods for bread-making.

The part of the yeast we use for bread-making is

its power to change sugar into alcohol and carbon-dioxide. Adding yeast to flour and a liquid, with the dough kept at a temperature of 72° to 78°, causes chemical changes. These changes finally produce a gas called carbon-dioxide, which leavens the dough. The gas is lighter than the dough and lifts up the walls of the dough, but we must not allow the alcoholic fermentation to proceed too far. That is, the dough must not expand too much or acetic fermentation sets in and will sour the dough; so we stop this by baking the dough in a hot oven while the starch is browned and changed into dextrin and forms the crust on the bread, which is sweet and partly digested.

In using compressed yeast, we soak the cake in a liquid to separate the organisms and then mix them into the flour. Salt is added to flavor the dough — too much salt will retard the growth.

The greater the number of yeast plants, the more quickly the bread dough is lifted up. In our school work we use a large quantity of yeast to hasten the growth of the plant, as our time is necessarily limited.

Liquid Yeast. 2 quarts boiling water, ¼ c. salt, 6 potatoes, 1 c. granulated sugar, 2 c. yeast.

Peel and grate potatoes, cook in the boiling water. Stir potatoes as grated into the boiling water, cook about 12 minutes after all the potato is grated in. Stir in sugar and salt and when about 70° F., stir in the yeast. Let it stay at this same temperature twenty-four hours. Stir it occasionally as it becomes frothy.

Keep in fruit jars covered tight, but only about half full. Half a cup of yeast to a pint of liquid, mixed at night or early in the morning, is a good general rule.

BREAD MAKING.

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on yeast, take 1 tbsp. molasses, 1 tbsp. warm water, ½ yeast cake. Mix and put in a small bottle; invert bottle on saucer (uncorked); leave in a warm place. The molasses is good food for the yeast plant and the warm temperature is favorable to its growth. Hence gas (carbonic acid gas) is formed at the top of the bottle, and the liquid is forced out into the saucer. Conclusion: warmth is favorable to growth of yeast plant.

To show the effect of heat or hot water on yeast take 1 tbsp. molasses, 1 tbsp. hot water, ½ yeast cake. Mix and bring to boiling-point. Put into a bottle and invert as in Experiment 1. Result: no gas is formed and no liquid is forced out into saucer. Conclusion: boiling kills yeast plant.

To show the effect of cold or cold water on yeast, take 1 tbsp. molasses, 1 tbsp. cold water, ½ yeast cake. Mix and leave in cool place. A little gas is formed on top and so a little liquid is forced out. Conclusion: yeast plant is not killed by cold, but cold is not favorable to its growth.

From this set of experiments the pupils may be made to see that in making bread the water in which the yeast is dissolved should be warm, and the temperature for the rising should be warm, as that is the most favorable temperature for the growth of the yeast. A sugar solution would answer the same purpose as the molasses, as either is a favorable food for yeast plant.

Compare the conditions in the bread dough to conditions in the experiments. Thus: sugar is the food for yeast plant in the experiments. In the bread dough, the yeast plant changes the starch into sugar

and then uses the sugar as food. In using up the sugar it causes carbonic acid gas to be given off in the bread dough just as in the experiments. The carbonic acid gas formed in the bread makes it rise.

In the experiments it is found that yeast grows best in warm temperature. Hence we must keep the bread in a warm place, while it is rising. From the experiments it may be drawn from the pupils what will be the effect of cold upon the bread dough, i. e. it would rise very slowly, for cold hinders the growth of the yeast. If the yeast plant should be boiled, it would be killed, as is seen from the experiments. The rising of the sponge may be hastened by putting the dish in a pan of warm water. The amount of yeast in the small recipe is very large in proportion to the other ingredients, simply because it will be necessary to hasten the rising and force the bread.

Notes

In kneading, pupils will need much individual attention and instruction, as most of them are very awkward at the motion of kneading. When kneaded sufficiently, the dough is shaped and allowed to rise in the pans.

The baking may be managed by the housekeepers but the attention of pupils should be called to important points, such as tests for oven and time of baking.

The complete bread lesson should not be given in less than 2½ hours. In many places one whole session is allowed for each class. The authorities will usually allow a teacher to give two or three weeks to this lesson, so that one week the classes that usually come first in the morning may have the whole morning

session for the lesson, and no lesson the next week, when the second morning class may have the whole session for the bread lesson. The same arrangements may be made in the afternoon, if there are two classes. This is the most satisfactory arrangement, for the pupil sees each step of the process in order and in proper relation to the other steps.

If a whole session is out of the question, the lesson may be arranged as follows. The sponge may be started by some one before the first morning class and may be ready to be made into the loaf and kneaded by the time that part of the recipe has been discussed. While the dough is rising in the pans, this class may make the sponge for the next class and set it to rise. The amount of yeast to be used will, of course, be determined by the time between classes. After the sponge has been made for the next class, the discussion may follow, and the baking as soon as the dough is ready; the dishes may be washed during the baking. This method is not so satisfactory, because it is apt to be confusing for the pupils on account of the inverted order. Also there is not so much time for discussion, and the yeast experiments, if performed at all, will have to be done by the teacher entirely. The former method, in which each pupil performs the whole process in the proper order, is much more satisfactory, provided $2\frac{1}{2}$ hours or more are allowed for the class.

The discussion should be carried on between the processes of bread-mixing, kneading and baking.

ORDER OF LESSON

1. Discussion of individual recipe.
2. Making of the sponge.

3. Yeast experiments.
4. Discussion of the rest of the recipe. The whole process of bread-making, the method of mixing, the rising method and reason, the kneading methods and reason, and baking.
5. Kneading, and shaping into loaves.
6. Dish-washing during baking.

TEA

Lesson XXVIII

Botanical origin. Tea is the dried leaves of a shrub. It is derived from two species of the same shrub, Thea sivensis, and Thea viridis. They belong to the same family as the camellia.

History. Our traditions of tea are associated with China. The word is of Chinese origin, for tea was first cultivated in China. It was not used in India in the early days, for there is no Sanskrit word for it. In 350 A. D. it was cultivated and used in China, but not extensively until the 6th or 9th century. Its use in Japan dates back to the year 1598. There is a temple in Japan dedicated to the man who first introduced tea. When it was first imported into England in 1665, it was sold for $15 per pound, excellent quality. Its cultivation has spread in other countries, but not so extensively, because cheap labor is as essential to successful tea-growing as favorable climate, soil and situation. A great part of its manufacture is carried on by hand. The increase in cultivation has been great of late years.

Distribution for Commerce. China, Japan, India, Ceylon, some British provinces, and the United States are centres of distribution. In the United States

tea from China was first used, then from India, on account of the modern methods of cultivation. The science has been brought to a fine point in soil preparations and in the use of Peruvian traction-engines and agricultural machines. Now there is a tendency to return to Chinese tea again. On account of the severe competition of the last few years, modern machinery has been introduced; and modern agriculture is now necessary to the success of the cultivation. In 1851 a British government commission, composed of scientific men, was appointed to investigate the making of tea, and they reported that the water for tea should be allowed just to come to a boil.

Growth. Tea is a sub-tropical plant growing in a zone from 20 to 31 degrees N. or S. latitude, westerly or easterly divisions. The best latitude is 24 to 35 degrees N. or S., but tea will grow in almost any temperate latitude. Occasional frosts do not kill the plant when it is under a sub-tropical sun. The chief danger, to be sure, is from frosts, but the plant is hardy. The flavor is injured by frosts, though the life of the plant is not. Tea grows best in a somewhat moist slope of southern aspect. In China much of the tea is grown in 11 degrees latitude on hillsides at an elevation, where are deep, rich soil, good drainage, and abundant sunlight. Where a slope does not provide shelter, the tea is planted near quick-growing trees.

The soil needs little attention and a poor soil will answer the purpose.

The seeds are gathered in October and kept in fresh sand till spring. Some seeds germinate in four to six weeks, others in four months, but most not until the

advent of rains. As soon as the plants are 4 inches high, they are transplanted and put in rows 5 feet apart, so that pickers can work easily between them. For three years they are allowed to grow undisturbed, except for necessary prunings, and even then care is taken not to strip them, for the leaves are the main organ of this as of other plants.

The tea-plant is now a shrub, but a wild variety supposed by some to represent the original stock attains the size of a large tree. It will grow from 30 to 40 ft. in height and have a stem one foot in diameter, but the plants are generally pruned to a height of 3 to 5 ft. If the situation is exposed the plant is kept low, so that it may not be injured by the storms and winds; but in a sheltered position it is allowed to reach a height of 6 ft. or more. The leaves, when full grown, are from 5 to 9 inches long. Women and children are employed in gathering the leaves. They can often gather from 16 to 20 lbs. of raw leaves in one day. One lb. of dried tea equals 4 lbs. of green leaves.

The gathering is done during the rain when the leaves are full in size. The first crop is gathered after three years of the plants' growth, but this crop is not full and the leaves are hardy. The tree is then cut down and springs up again from the root. This is repeated till the tree dies, after 30 or 40 years. The third season each plant yields about ½ lb. raw leaves or 2 oz. manufactured tea. The average yield is 80 lbs. to 1 acre.

Two years more increases the yield tenfold. The leaves are picked three times a year. Those gathered first, in April, are considered the choicest, for they contain a larger proportion of juice in relation to the

solid matter, and are more pliable. The value of the tea is in the juices, so the finer and more delicate the texture of the leaf, or the less developed and aged, the better the quality of the tea. A large portion of the first crop is kept in the country for the use of the wealthy, but some of it often finds its way in small quantities on the backs of horses in caravans to Russia, and of late years a little of it is sold in the markets of Great Britain and the United States.

At the first gathering, the middle of April, the old fibrous leaves are left on the tree, and the young leaves are removed by hand, and a few of the soft succulent stalks are taken with them. The finest black tea from the tender buds at the end of the twig is kept separate. The second gathering is made the first of July, when the leaves are full-sized, and the third the middle of July. After July the plant needs little attention. There is sometimes a fourth gathering in August, but usually the plant can stand but three gatherings.

Preparations for Market. The leaves are gathered rapidly to prevent crushing and fermentation, and are touched with the hands as little as possible. Since the leaves are apt to set up a process of fermentation, they are rarely conveyed in bulk.

Curing. The object of the curing is to get rid of the moisture, and prevent decomposition, and also to bring the virtue out of the tea. Curing also breaks down the plant structure to some extent. The method of curing differs with different localities. The Chinese method is chiefly by hand and the Indian by machinery.

The process of curing includes drying, rolling, and

firing. The leaves are dried by steam or charcoal without smoke, heated evenly by movements with the hand or by shaking the vessel. They are sometimes dried in the sun and trodden out by barefooted men in order to break the fibre and dry them quickly and better. For export the leaves are more highly dried to keep the flavor. Tea which comes by way of the Pacific Ocean, where it is in the same latitude all the way, is much better flavored than that which comes by the Cape and Suez Canal. The method differs in the black and in the green teas. The black teas are dried before being fired, and the green teas are fired at once, or seasoned before drying. The chlorophyll or green coloring matter of plants is not changed, so the leaves remain green.

For Black Teas. To cure black teas, the leaves are exposed to the air until dry, then tossed until soft, and then left piled in heaps for a while before they are fired. After firing they are rolled about on rattan frames, and dried slowly over charcoal. When partly dried they are rolled again, then dried and repeatedly rolled. The color of black tea depends on the exposure to atmospheric changes (fermentation).

For Green Teas. To cure green teas, the leaves are steamed in a small boiler. The steam swells the plant and heats the juice to evaporation. It liberates the essential oil which is then rubbed in with the hands; after the leaves are fired they are dried carefully and rolled in form for the market, by feet or hands.

From the rubbing in of the oil by hand, the green tea gets its special flavor. The color of green tea depends on the rapidity of drying, while the gloss

depends on treating and manipulating with a little Prussian blue, mixed with gypsum and indigo.

Artificial Flavoring. The high-class teas are not treated in this way. The tea leaves are placed with aromatic flowers of other plants. For example, the Olea fragrance is used to make the scented Pekoe. Odors thus imparted to the tea leaves are evanescent, but delicate and agreeable, and give pleasant varieties to the inferior teas. Scented teas are always mixed with stronger, unscented teas.

Varieties of Teas. Varieties depend upon time of collecting, stage of the development of the leaf, method of curing, etc.

Pekoe. This is made from the smallest leaves, and Flowery Pekoe has very tender tips with some of the tea flowers. It has a very delicate flavor, but not a full body, and is rarely used alone. For Orange Pekoe two small leaves next to the top are taken. All Pekoe teas are very expensive.

Souchong. These are the leaves next to the Pekoe. They are larger leaves without the ends of the twigs.

Hyson. This is a variety from the earliest pickings of the buds and half-open leaves in April. The leaves are then closely rolled, and are greenish and delicate in flavor, as they contain a large proportion of juice to the solid substance in the leaf. It is prepared with care in order that it may be perfectly preserved.

The Commercial varieties are the Green and Black Hyson, Imperial Gunpowder, Japan and Java.

Black Teas. Kaison Caper (plain and scented), Baked Souchong (little leaf), and Oolong (the Chinese word for black dragon), are black teas. The division

is according to the locality of cultivation. The Indian teas are black teas.

Tea culture is now successfully carried on in Pinehurst, N. C. Gunpowder is the best green tea and Pekoe is the best black tea. Substitutes for tea are made from native plants and were used by the Colonists at the time of the Boston Tea Party.

Paraguay tea is much used in South America, where the natives flavor it with lemon juice and burnt sugar, and suck it through a straw. It is made from Brazilian holly, of which there are three varieties, according to the development. The first or best quality is made from the unexposed buds; the next from the full-grown leaves; and the next from the whole leaf roughly roasted. This beverage is not delicate in flavor as are the real teas. It is more bitter and astringent as well as more narcotic than the Chinese teas.

Chemical Composition. The constituents of tea are: theine 1 to 4%, starchy oil; tannin 16 to 27%, vegetable fibre; casein, gum and sugar; aromatic oil. The most important constituent is theine. With this is combined tannin. Theine is an alkaloid, similar to caffeine in coffee. They are easily isolated. Alkaloids form the active principle of plants which affect the nervous system. They are usually colorless and crystalline.

The Composition of Hyson Tea is ethereal oil 6%, chlorophyll 1.84%, resin 3.64%, gum 7.28%, tannin 12.88%, theine .46%.

Food Value of Tea. It has been estimated that a pot of tea ordinarily made does not contain more than a grain of nitrogen, so that as a food it

has practically no value. It does not take the place of food.

Physiological Effects. Tea quickens the intellect and imagination, produces wakefulness, increases muscular activity, and stimulates the nervous system, and thus is very unsuitable as a food for the young. In excess it produces nervousness. It increases respiration greatly and therefore is not suitable to take late at night, as a subsidence of respiration is necessary to good sleep. Coffee is also respiratory in effect. Tea, like coffee, reduces circulation and it increases perspiration; therefore it renders a large amount of heat near the surface latent, but changes fluid into vapor. The value of this depends upon the sensibility of the skin (less useful if sensitive); whether well or ill fed; upon the weather (less valuable in cold weather); upon the foods taken, constitution, clothing, occupation, temperature, moisture of the atmosphere, etc. Coffee decreases the perspiration and dries the skin.

Tea promotes assimilation but not digestion, and it supplies a large amount of oxygen by increasing respiration. Coffee is more fitted for poor and for feeble people. Tea is not suited for the young, as, like all stimulants, it affects the development of the nervous system. It is useful to elderly people and to those with delicate stomachs, incapable of digesting much food, but it must be remembered that it does not take the place of food. Coffee is better fitted for breakfast, for the skin action is then great and the heart action feeble. If taken at dinner it should be taken immediately after the meal. Tea is better adapted to the wants of those who eat too much, than to the poor and ill fed. It should not be taken

without food except after a hearty meal, nor should it be taken with insufficient food. It is suitable to take after a full meal, when assimilation should be quickened. Tea at 5 o'clock is very bad, unless just after a hearty lunch and several hours before dinner. Tea before meals is injurious and promotes irritation of the stomach.

Milk in Tea. This tends to increase the respiratory action of the tea and gives nourishment to the body, and so makes it more of a food. Milk in coffee forms more perfect food than milk in tea, for milk and coffee have the same action on the skin and so aid each other, while tea and milk counteract each other in this respect.

Lemons in Tea. There are sugar and vegetable acids in both lemons and tea, so the effect is the same. Both are changed into CO^2, which is not supposed to be wholesome.

Household Suggestions. Keep tea in a dry, moderately cool place, tightly covered to exclude the dirt, dampness and foreign odors. It easily absorbs pungent odors which change the character and flavor. Never mix in damp and rainy weather. It absorbs dampness and is injured by oxidizing effects of the atmosphere.

Buying. The finest green tea is not obtainable in this country. Hyson is the best. Of the black teas, buy Congou for economy and to use as a foundation for mixed teas. Buy Oolong for light-colored infusion with penetrating flavor. It is better mixed with others than alone.

Tests for good Tea. Good tea has little or no starch and the leaves are closely rolled. The ripest and jui-

ciest curl the tightest and retain their form the longest. The leaves are small and young. Black tea should resist a gentle pressure without breaking. When old and sapless, it is brittle and crumbly. Blow or breathe on it, and inhale the odor. It should dissolve rapidly on slight mastication.

Preparation for the Table. Aim to extract all the aroma and the dried juice containing the theine, but as little as possible of the tannin, and only as much of the substance of the leaf as may give fulness or body to the infusion. The time of infusion should be 2 m. if the tea is scented or artificially flavored, but for ordinary teas 5 m.

Method. Pour freshly boiled water over the tea, and let it infuse below the boiling-point for 5 m. If cooled too much, it is weak in all its constituents. If boiled, the aroma is dissipated. Ten or 15 m. is sometimes not too long to infuse young, fine, tender leaves, but if old leaves are steeped more than 5 m. or 10 m. the tannin is increased and the flavor of the tea is injured. Have the teapot warm before putting on the infusion.

Water for Tea. Tea may be also made by covering with cold water and bringing it to a boil, after which the infusion is strained off from the leaves. However, the theine is not so well extracted by this method. Distilled water would be good to use in making tea, except for the absence of air and minerals. On this account it does not make agreeable tea. The Chinese say: "Take the water from a running stream. That from a hill stream is best, river water is next best, and well water worst of all. The fire must be lively and clear, but the water must not boil too

heartily at first. It begins to sparkle like crabs' eyes, then somewhat like fishes' eyes; lastly, it boils up like pearls innumerable springing about."

Serving. In China tea is served with no cream, no sugar, and no milk. In Japan it is powdered; hot water is added and stirred in with bamboo twigs until it froths. The Japanese drink powder and all. In Russia tea is served with lemons; in Switzerland with stick cinnamon added to increase the flavor; in England with sugar and milk; and in Tartary the leaves are boiled with soda and eaten with salt and butter.

Making Tea. Water must be freshly boiled and not allowed to stand before pouring over the tea.

Use a clean, dry-heated teapot. A china teapot is best. One teaspoon of tea to a cup of water is an average recipe.

Put tea in hot teapot and pour the water over the tea. Put cover on and let the teapot stand on the back of the range for about five minutes. Pour the tea off the leaves at once. If too strong, dilute with boiling water. If stronger tea is desired, add more tea, but do not steep longer to make tea stronger.

Iced Tea or Russian Tea. In making iced tea, we use more tea than when tea is to be served hot. Make tea as above and pour off the leaves, then on cracked ice in glasses. Serve with slices of lemon and sugar, if desired.

Method. Pour a cup of cold water on a heaping tsp. of tea. Let it stand all day in a refrigerator. Pour off the liquid, heat, and serve as desired. This is used especially for iced tea.

School Recipe. Pour boiling water in the teapot (or saucepan — not tin). When the pot is thoroughly heated, empty it. Pour one cup of freshly boiled water over 1 tsp. of tea which has been put into the hot pot. Let it steep 5 m. and then serve. If too strong, dilute it with boiling water. If the tea has to stand, pour off the tea from leaves. Serve plain, or with sugar and milk or cream, and without sugar and with a slice of lemon.

It is not necessary for each pupil to make the same amount. It may be made from ½ tsp. tea and ½ c. water. When economy is necessary the tea may be made by groups of any number, the smaller the better. If time allows, especially with advanced pupils, good tea may be tested by teacher or pupils. If good, the leaves are small (easily seen in water), tightly curled and pliable.

Notes

Kind	Weight in grains	No. spoonfuls in 1 lb.	Kind	Weight in grains	No. spoonfuls in 1 lb.
Black			Congou (fine)	87	80
Oolong	39	177	Hyson skin	53	120
Congou (inferior)	52	138	Hyson	66	106
Flowery Pekoe	63	113	Fine imperial	90	77
Souchong	70	100	Scented Caper	103	68
			Fine Gunpowder	123	67

The fresh leaves have neither odor nor flavor, so they are usually dried in the sun. They are rolled up by hand.

Green teas are dried artificially and rapidly, so that

the leaves keep their natural color. Black tea is dried slowly by the sun, so that it loses the green color.

Preparation for table. Have pupils taste water in which the tea has stood. The theine has flavored it. Boil it 5 or 10 m. Let it stand. The tannin flavors it and it has a bitter taste.

ORDER OF LESSON

1. Distribute to each pupil a little tea (a leaf will do). Ask them what it is and why they think so. Let each pour boiling water on her tea and watch the result. What then is tea? (It spreads out in water and shows that it is a leaf.)
2. The plant.
3. Preparation for market.
4. Varieties.
5. Value as food.
6. Physiological effects.

THE DINING-ROOM AND SERVING

LESSON XXIX

Theodore Child said: "The best decoration for a dining-room is a well-cooked dinner. Yet that dinner will taste all the better in a room that is rationally furnished, tastefully decorated, and the temperature of which is maintained at an agreeable point.

"The most famous dining-room of ancient times was perhaps that of Lucullus. As he ate the Roman dainty of thrushes, he could at the same time feast his eyes on their living forms and tickle his ears with their beautiful song. The revival of this idea in modern

days, brought about by the discovery of the elaborate decorations of the Pompeiian dining-rooms in decorating the room with stuffed skins of fish and game, is even less commendable. A dining-room should be characteristic, light and gay.

"One of the famous dining-rooms of modern times is that designed by the artist Whistler for a London house. The walls are pale blue, decorated with arabesques (relating to Arabic architecture) that recall the feathers of a peacock. Peacocks decorated the carved panels of the window shutters, and blue and white china was placed on gilt shelves. One almost suspects that this color scheme and decoration was suggested by dining-rooms of Chinese mandarins that chanced to be of royal blood, for the walls of these rooms are hung with yellow, and against these hangings rest the blue and white china. Particularly does this notion occur to one who looks into Whistler's own room. His walls are hung with canary yellow and the only decorations are the blue and white china. Comte Molé used to change his decorations to suit his guests. For example, in giving a dinner to a foreign diplomat, pictures, flowers and plants were used characteristic of the fatherland of his guest. Lord Lonsdale went so far as to make the color scheme of the room suit the complexion, hair and eyes of his guest."

But times have changed and the most intelligent people of today furnish their dining-room very simply and artistically, depending upon perfect cookery, absolute cleanliness and delicate service as an ideal environment in which to live and to entertain their guests.

The school dining-room may be simply but attractively furnished. Pupils may discuss with the teacher the kinds of wood used for furniture — its treatment — some emphasis may be placed upon the tendency of to-day to preserve the beauty of natural woods in furniture, and that even the simplest home may be artistically furnished by choosing furniture with good lines and designs, that can be obtained in the inexpensive woods; that no article of furniture is cheap that is heavy and inappropriate even if it be decorated with cheap carving.

The pupils may discuss the kinds of rugs appropriate for a dining-room, and be told that a simple rug, well made and chosen with reference to the color scheme of the room, is in good taste.

It is very necessary that the first principle of house-furnishing be a part of every school curriculum, and that these principles be taught the young children. If this were universally done we should have many improvements in convenience from landlords. Articles of furniture that can be made a structural part of a house or a part of the builder's plan, should be built in when the structure is made.

Attractiveness. The dining-room should be well lighted. There should be a care to make the table and food pleasing to the eye. Well-laundered linen, and table ware which has been properly washed and wiped and is arranged in an orderly manner, are the strongest factors in making a table attractive. Ferns or flowers adorn and brighten a table more than anything else that can be used. Such decorations are in place on the humblest as well as the most sumptuous tables. The table linen should be as fine in quality

as one's purse can buy. The oftener a good piece of linen is laundered the more beautiful it grows, so that a good piece is always cheap in the end. If the linen is of a very heavy quality, it should not be starched. If it is thin, however, it will require a little starch to give it body.

The Table. As far as it relates to the table, one point in the dining-room may be regarded as the center. The chandelier is usually this point. The center of the table should be exactly under the center of the chandelier.

Protection of the Table. Food served hot requires warm plates and serving dishes, so that it may lose none of the heat while being served. The serving dish should be warmer than the plates. As heat mars varnished and polished surfaces, the table must be protected by some substance that will keep the heat from spoiling it.

The first thing in the laying of the table linen is the placing of the thick cloth of felt, double Canton flannel, or of one of the many thick materials made for this purpose; flannel is better than cotton, as cotton is not a good non-conductor of heat. Thick mats placed under hot dishes are a protection. Tiles are often used, but they absorb heat and transmit it to the table unless they are set in a frame or on little feet. Even then they are not satisfactory supports, as dishes are apt to slip on the glazed surface. A thin pad of flannel covered with a linen slip may be placed under the carving-cloth. For coffee, tea, or hot-water pots, a broad tile or a slightly raised wire frame may be used. On this place the linen-covered flannel pad. The flannel preserves the heat in the

vessel set upon it. If the tea or coffee-pot is placed on the cold tile it loses heat rapidly. A polished surface is a costly luxury if, for the sake of protecting it, one's food and drink must suffer from lack of temperature. But with pads of non-conducting material on tiles or other supports, which are raised to allow a current of air to pass between them and the table, food may be kept hot and the polish of the table preserved at the same time.

The under-cloth protects the table from hot dishes, protects the table-cloth from wear, especially at the ends and corners, makes even a handsome cloth look handsomer, and keeps the dishes from making a noise. It is sometimes called a "husher" or silence-cloth. When this cloth is smoothly in place, spread the table-cloth over it, taking care to have the center crease come exactly in the center of the table, and crossing the crease of the cross folds in the center. The use of the table-cloth is to make the table look neat and attractive, to prevent noise from dishes, and to protect the table from hot dishes, scratches, etc. But it has been seen that the table-cloth is not sufficient. The under-cloth is a necessity.

The lines of the table being true, put the plates in position. The distance between plates should be at least twenty inches. When they are correctly placed, it will be easy to arrange the table symmetrically. Place the center ornament next, and then the silver and glass.

Setting the Table. Place knives and spoons at the right of the plate, having ends of the handles near the edge of the table, with the sharp edge of the knife next to the plate and the inside of the bowls of

the spoons turned up. Place the forks so that the prongs will not make rough places in the table-cloth. Put the glasses on the right of the plate, the water glass coming to the point of the knife. If carving-cloths are used, arrange them before the plates are put on the table. Fresh napkins should be placed on the plates or on the left-hand side. If the napkins are in rings, place them at the side.

Individual butter-plates and small butter-knives, called spreaders, may be put at the end of the forks. If individual salt-cellars and salt-spoons are used, they should be placed at the corner, or within the reach of the people —or a salt-cellar and salt-spoon may be placed at each plate, English fashion.

If a carafe is used, put water in it before the meal is served and set it in the refrigerator to keep cool. This is better than serving ice-water.

The water may be served from the carafe at the table or the glasses filled just before the family is seated and refilled, as needed, by the waitress. Bread and butter may be placed on the table or served from the side table; butter is often placed on the individual plate with the small spreaders and the bread served from the side table.

Hot breads, of course, are served from the kitchen on hot bread plates. Before calling the family to the dining-room see that all is in perfect order— chairs properly placed at the table, light turned on, and water poured in the glasses.

In giving this lesson teachers may have pupils make lists of dishes needed, and have the order of setting the table made clear.

The Breakfast Table. The arrangement of this table is after the general plan already given. If fruit

and cereal are served, there should be a fruit-knife just at the right of the plate, also a fruit-spoon next to the other spoon or on the left next the fork. The fruit-plate should be covered with a doily, on which rests a finger bowl one-third full of water. Warm dishes for the cereal, and a spoon to serve it, should be set before a member of the family, small dishes at the left, spoon at the right. Cups, saucers, sugar, and cream for the coffee-pot should be placed at the right of the mistress. If the family is small or only one maid assists in serving, the carving will probably be done at the table, — then place the carving-knife and spoon at the right, the fork at the left.

Pupils should know how to sharpen a carving-knife with a steel, and know that this must be done each time before using it. When the school luncheon or dinner at home is served, pupils take turns in carving and in sharpening the knife.

The Dinner Table. The general directions for the dinner table are the same. The carving-sets are laid at the carver's plate and the soup-ladle usually at the place of the mistress. Oil and vinegar bottles are placed on small doilies at one side of the table, or if the service is ample they may be brought to the table when needed. For a dinner of soup and celery, meat, potatoes and some other vegetable, salad, crackers, cheese, dessert and coffee, only a soup-spoon, two forks, dinner-knife, napkin, glass, salt and pepper should be put at each plate. The center-piece, instead of being fruit as at breakfast, should be flowers or a plant.

In serving dinner, be sure that the following are ready for use in case they are needed: knives,

glasses, forks, spoons, etc. Have the after-dinner coffee-cups and saucers, spoons, sugar and cream placed on a tray ready for serving. They are usually placed by the plate at the time of serving.

For informal and home dinners, the hostess serves the soup, salad and dessert, and the host the roast.

For a more formal dinner and when there are a number of servants, all are served "from the side."

For the dinner the maid must take the soup plates, vegetable dishes, dinner plates, meat platter and soup tureen into the kitchen and place them where they will be warmed, or put them through very hot water, being careful not to crack fine china.

The olive dish and salad bowl, and plates for salad, must be chilled before using.

If salted nuts and bonbons are used, they may be placed on the table or served from a side table. Bread, if served, placed in napkins, as directed.

When ready say to the hostess, "Dinner is served."

Have pupils plan simple dinners, bringing in a carefully prepared menu the week after this lesson. Menu, place and souvenir cards may be planned and executed in the art periods. The importance of the balanced diet could be brought in and valuable knowledge acquired. Interest may be aroused to such an extent that some good lessons in rational menus will be the result. The pupils will be interested in computing the expense and in planning the food value of a simple dinner.

The Luncheon Table. The arrangement of this table is practically the same as already given in the general directions, with the addition of the proper articles appropriate for the serving of the food for this meal.

The Tea Table. This table should be bright and cheery. Use dainty china, sparkling glass and silver. All the articles for making and serving the tea, such as tea cups and saucers, sugar, cream, teapot, hot water, and bowl for waste, should be placed by the side of the mistress. If the tea is to be made at the table, the tea-kettle filled with boiling water should be in place, and the lamp under it lighted, just before the family sit down to the table. The substantial dish, whether hot or cold, should be placed at the end of the table opposite the tea service. As this meal usually consists of tea, bread and butter, cold meat, or some hot relish, cake and preserves, the food may be placed on the table before the family sit down. When the usual tea is replaced by a hot supper, it is necessary to have warm plates and to change the plates when the sweets are served.

WAITING ON THE TABLE

Position of Waitress. The waitress should stand at the back of the mistress or, while the meat is being carved, back of the carver. When it is ready to be served, she should take each plate in her right hand and place it before the one for whom it is intended. If vegetables or a sauce are to be served with the meat they should follow as quickly as possible, the dishes being passed on a tray or held in the hand. She must go to the left of the person served and hold the dish so low as to enable one to serve himself with ease. Everything is served at the left except water, and other liquids that must be poured into a glass. All soiled dishes are removed from the left. Sometimes the plate of soup, fish, meat, etc., should be

placed in front of the person served, and not held for him to take. The waitress should hold all large dishes in her hand and pass small ones on a tray.

At a dinner or a luncheon, before serving the dessert everything except the glasses, olives, confectionery and fruit must be removed, and the table must be brushed free from crumbs. The best implements for doing this are a small tray and a broad-bladed knife like a fish knife. The knife should be used gently and lightly so as not to injure the cloth. Pieces of bread or any fragments on the cloth should be lifted with this knife and put on the tray. The waitress should never pile one dish upon another. When one has finished a course, the knife, fork or spoon should be placed straight, on the center of the plate, so that there may be no danger of accidents when the plate is lifted. Only two such plates should be removed at a time. Large dishes should be carried out in the hands, small dishes on trays, and never piled one on another. Unless the carver is careful to place the carving-knife and fork in a secure position, it is best to avoid all possibility of accidents by removing them on the tray. In order to make various changes quickly it is a great convenience to have a large table in the pantry off the dining-room on which the dishes may be placed as they are removed from the table. If there is a second person, who can sort the dishes and put them aside as rapidly as they are brought out, matters will be much simplified.

All these details are very necessary for young people to know. They must be carried out very carefully. It is important that they should know how to serve a simple dinner in an attractive way.

Pupils must not only lay the table for dinner in the school dining-room, but they should be requested to lay the table for the family dinner at least two or three times during the week of this lesson, and be asked to report upon their success in doing this.

Fruit is usually the first course for the average breakfast. The fruit plates with a doily and finger-bowl are placed before each person. The doily and finger-bowl are removed from the plate, and the fruit is then passed to each individual by the waitress at the left of each person.

Such fruit as grape fruit and oranges are prepared by the waitress and placed on the table just before breakfast is served.

The simplest way of serving is first to the hostess, then to her right to the next guest and so on. In serving the breakfast at the school laboratory the pupils taking part of the waitress must watch closely to see if any one wishes more water. The water glasses may be filled while fruit is being eaten. When all have finished, place fruit dish on the side table and remove the individual fruit plates, taking them to the kitchen or pantry.

The second course is usually a cereal. Place this before the hostess with individual dishes and table-spoons. Waitress places cereal plate on the tray with cream and sugar and passes to the guests. Some prefer to pass the individual cereal dishes, then the cereal, sugar and cream; then each guest takes the portion of cereal he desires. Remove the cereal course as in the fruit course.

Warm plates and the platter are now placed before the host for serving the next course.

The waitress serves this course to each guest at the right. She then brings the potato-dish from the side table, and passes same as in cereal course. Pass toast, muffins or bread, and bring in the coffee-pot. Sometimes the coffee is made on the table, in a coffee-percolator. In this case, the alcohol lamp should be lighted, at the beginning of the cereal course. It will then be ready for the third course. Pass the coffee, cream and sugar to each individual.

The soup tureen and hot soup plates should be on the table when the family enters the room, if soup is used as a first course. Soup is ladled from the left side. Place the soup-plate before the individual at the right of the hostess. Place cover on tureen, after all are served. Celery may be passed now, or it is often placed on individual butter plates.

Remove soup tureen, after all have finished, and then take each plate away separately.

If the host is to carve, now place the roast, gravy spoon, and carving-knife before him, with a fork at the left, knife at the right.

Serve roast same as third course at breakfast.

Serve potatoes on a tray, a spoon in the dish, and serve at the left of each guest, beginning with the hostess and going to the right. The other vegetables may be served in same way.

Vegetables are usually cooked dry enough to be served on the dinner-plates.

Place gravy-boat and spoon on a tray and pass. Serve olives in the same way. When guests have all finished take carving-knife and fork to the kitchen and pantry on a tray; then take the roast. Remove dinner-plates, taking one in each hand.

Bring in the salad bowl, salad plate, salad knife and fork. Serve same as the meat course. If crackers and cheese are to be served, serve now. After this course remove salad bowl, plates, water glass, salted nuts and olives, all by hand; pepper and salts on a tray. Remove carving cloth, crumbs, etc. Now bring in the dessert and place before the hostess, and serve same as the salad. If fruit is the dessert, serve same as fruit course at breakfast.

If large coffee is served, it may be placed at the right of each guest, and cream and sugar passed at the left. If after-dinner coffee is served, small cups and saucers with cream and sugar are placed upon a tray and brought in and placed before the hostess, the waitress passing each cup, and then offering cream and sugar. The dinner could be planned and served by the class to guests or the teachers of the school at any time. This would be a simple family dinner. It could be made a little more elaborate by serving raw oysters on the half-shell as a first course, and a fish course after the soup. Then follows fish with sauce and bread, sometimes potatoes in some form. The next course may be a relève, — either a joint of meat or poultry, roasted, broiled, or boiled, and one vegetable. If the fish was boiled or baked and served with a sauce, the relève may be omitted and the entrée served. Next may come a water-ice, half frozen, or a cheese or vegetable course. Then serve the roast, or broiled poultry, or game with a salad to be eaten with it. This salad may be lettuce, sorrel, chicory, cress, etc., with French dressing, or it may be crisp celery with mayonnaise dressing. Some light cold sweet dish

may form the dessert. The dinner should end with small cups of strong black coffee, which may be served here or in the drawing-room. Cream and sugar are passed with the coffee. This might be considered as a simple dinner, but if it is well cooked, it is a very satisfactory one.

The Waitress. The personal appearance of the waitress requires special attention. She should be trim in appearance, quiet in manner, and light of foot. Her dress should be clean and well-fitting, and her apron, collars and cuffs spotless. Fashion decrees a black dress, white collar and cuffs, and a small white cap. In many well regulated households, the waitress wears a light print dress, — a fashion which commends itself because it means freshness and cleanliness. She should wear soft-soled shoes or slippers.

Attention. The waitress should understand her duties so well, and should be so attentive, as to render it unnecessary to ask for anything during the meal, unless a special taste not anticipated is to be satisfied. During a ceremonious dinner or luncheon, it is particularly important that all service should be rendered without exchange of words between mistress and maid. This can be accomplished only by seeing that the maid has a clear understanding of all that is required, and that she is watchful of each guest. If it is her daily habit to discharge her duties carefully, she will be in proper training for more formal occasions.

Regular Duties. The regular duties of the waitress, as they are related to the dining-room and its accessories, are varied. She sharpens the carving-

knife and announces a meal. This announcement varies with the habits of the family and the style of living. If it is the family custom to gather in the living or drawing-room before each meal, the waitress, coming to the door, addresses the mistress of the house and says, "Dinner is served." When the family is large and scattered at meal-time, and the service is limited, the meal is announced by a bell or gong, which should be as musical as possible.

Before breakfast the waitress should air and dust the dining-room and if necessary make an open fire, brushing and dusting the hearth. She should place the plates and serving-dishes to warm; set the table; prepare butter, cut bread, draw cold water; place breakfast on the table. If she is not required after the coffee and substantial part of the meal are served, she may leave the room to attend to other duties. If but two maids are kept, the waitress then goes upstairs to air beds and chambers. After this, her own breakfast is served.

Clearing the Table. Have a tray upon which to gather all silver and knives. Keep silver and steel knives separate. In the pantry place knives up to handles in a pitcher of water. Tin pitchers are made for this purpose. The silver is put into a similar pitcher of water. Place all small articles on a tray and carry them into the pantry. Sort the dishes, rinsing them off under the cold water faucet. Pile them in kinds on one part of table. Fill empty milk and cream pitchers with cold water and set aside to soak. Return to dining-room and brush the crumbs from the table-cloth. Remove the cloth and fold carefully in creases. Put it away with napkins,

and dust and air the room. Then wash the dishes. After the milk and cream pitchers are washed, fill them with boiling water and let them stand until all the work in the pantry is finished. Wipe the pantry shelves and examine receptacles for bread, cake, sugar, etc. See that they are clean and that the food is in good condition. Make a list of needed articles. Wash the tables, sink, dishpans; wash the towels and dishcloths, and hang them out to dry. Sweep the pantry floor and wash it if necessary.

The noon-day meal, whether dinner or luncheon, will require warm dishes, which should be put in the heater at least one half hour before serving the meal. The waitress should see that the dining-room is properly heated in winter and that the shades are arranged to make a pleasant light. The table should be set; bread, butter, and water prepared, and the meal served on time. If there are to be salads, cheese, fruits, etc., for the meal, the waitress usually prepares them. She also has charge of the pickles, olives, sardines, potted meats, fruits, and similar dainties.

Dinner as a rule comes in the evening and requires special care on the part of the cook and waitress. Warm dishes for hot food and cold dishes for cold food are invariably needed for this meal. It is of great importance that the waitress should understand the necessity of serving hot food on well-warmed dishes and cold food on absolutely cold plates. A cold plate will quickly absorb the heat from soup, sauce or fish, while a warm plate will ruin food that should be served cold. At the same time, the plates must not be so hot that they are

difficult to handle, or they will mar the surface of the table. Bread is usually cut thick for dinner. If the loaf is square, divide the slice into two or four parts, according to the size of the loaf. Slices from the round French loaf are not sub-divided. Bread for other meals should be cut thin.

Since the duties of the waitress vary with the habits and circumstances of the family, mention has been made of only such duties and methods of performing them as belong to the service of a trained butler or waitress, and which often form part of the work of any housemaid.

The waitress is made responsible for silver, glass and china, and she is expected to keep them clean and intact. To do this, she must have proper appliances. There must be a place for everything and everything must be kept in its place. Ample closet-room must be provided, in order that there need be no crowding of china, etc., or of piling up many delicate dishes. There should be tables in the pantry so that when the dining-room table is being cleared it will not be difficult to dispose of the dishes. The sink must be broad enough, and the water faucets high enough, to prevent danger of striking the dishes against the projecting faucets. If the sink is narrow and the faucets low there should be a large tray of galvanized iron, which should be placed on the table to hold the dishpan. This precaution will be found to lessen greatly the danger of breakage.

Having plenty of hot water, soap and towels, and all other appliances, the waitress must do her part to protect the table ware, etc. She should

observe the following rules: — the water in which the glasses or china are put first must not be too hot; a few pieces only must be put in the pan at a time, and heavy pieces must not be placed on delicate ones; each piece must be wiped with care, and pressure on fragile articles of glass or china avoided; care should be taken that no sharp hard substance, as a grain of sand, is on the table or dish-cloth or in the dish-pan; delicate glass and china must not be exposed to extremes of heat or cold, as for instance, a hot substance should not be put in a cold dish and a cold substance, such as a frozen mixture, must not be put into a dish that has not been thoroughly and gradually chilled. A scrupulous observance of these little points will save a great deal of trouble and expense.

ORDER OF LESSON

1. Importance of the dining-room.
2. Care of the dining-room.
3. Setting the table.
4. Menus.

Notes

There is not time in one lesson of 1½ hours to prepare a meal and serve it and to discuss all these matters sufficiently. In the second-year course, two lessons should be devoted to it, one to the making of menus, and the other to the cooking and serving of a meal.

In discussing the table, the class should be around the table and the necessary dishes should be at hand, so that everything may be definite. Even though a meal is not to be prepared and served in this lesson, this topic can thus be more effectually discussed.

When an arrangement for the table has been decided upon, and each point of it illustrated as taken up, remove the dishes, and call on certain girls to set each place at the table while the rest of the girls act as critics. During this time questions may be asked in review about each thing that is done.

Breakfast Menu.

Fruit

Cereal, cream or milk, and sugar.

Meat or eggs. Potatoes.

Bread and butter. Drink.

If it would be of assistance, the teacher might find out from the pupils their usual breakfast. The safest way to do this is to ask them to write for you beforehand just what they had for breakfast on that day. This brings you in touch with their mode of living. If they belong to the poorer classes, the treatment of parts of the subject would differ somewhat from that in classes of wealthier girls. If they belong to the poorer class it would be absurd to urge fruit and finger-bowls. Recommend a glass of water for a first course. The cereals should be urged, for they are cheap, nourishing, and easily prepared.

After the skeleton menu is written on the board, discuss it from the point of view of the food value. Review the classes of foods, proteids, fats, carbohydrates, starch and sugar, mineral and water. Have the pupils pick out the starchy foods in the menu, as potatoes, bread, cereal; the proteid, as eggs or meat, and milk; the fats, as butter and

cream. Then a more definite menu may be suggested, taking into consideration the food value of the articles. Much time may be profitably spent on this subject. Put faulty menus on the board and have them criticised — i. e. a menu with excess of starch and lack of proteid, etc.

Skeleton menu of a dinner: —

Meat. Potatoes and one vegetable.
Salad. Crackers.
Dessert.
Coffee.

Coffee and salad may be omitted if thought advisable.

There will probably not be time to take up luncheon or supper menus, but should there be, a skeleton menu may be given:

Meat dish. Potatoes.
Bread. Butter.
Fruit. Dessert,
Cocoa or tea.

The home work for the pupils for the next division of this lesson will be to make out a menu for breakfast with regard to food, etc., meats included. More than one menu for each meal may be made out at home, and handed in. If there is time some of them may be criticised. Take time to read a few, and select one that seems good and can be carried out at the next lesson devoted to the subject. Let the class decide. These lessons are good preparation for a luncheon given by the class to invited guests.

The third division of this lesson should come two weeks after the first, for one lesson between

is necessary to discuss menus made out, and to select one. That takes only a short time, and the lesson between may be a regular cooking-lesson. The teacher then supplies articles necessary for preparation of the meal. She can select breakfast or dinner. Suppose she chooses breakfast; her menu will be something like this:

Oranges.

Cream of wheat.	Milk and sugar.
Dropped Eggs.	Potatoes.
Toast.	Chocolate.

Dishes that the class have already had should be selected in order to do away with much individual attention during the lesson and to give pupils confidence in doing things independently. Before class the teacher arranges the duties for each pupil and assigns them at the beginning of the lesson. It will be group work chiefly. Certain girls are to cook the cereal, others the eggs, others to make the toast, others the chocolate, etc. The cooking of the cereal will take the most time, so start the water for that before the lesson. Certain girls should have charge of setting the table, and girls not busy are to watch. A lesson like this teaches the girls independence and self-reliance. If the attention of all pupils can be had for a few moments at any time, discuss the serving of the meal. If not, take time just before it is placed on the table, with the class standing near the table. The fruit-dish is placed in the center and fruit-dishes at each place. The person served takes fruit from the dish. If the waitress passes with it to the right, the person served must use the

left hand in taking the fruit or move the right arm back. Either way is awkward, so the waitress must go to the left, as this makes it easy to use the right hand. Discuss these matters at length while the meal is served. Some of the girls may be selected to set the table, others to serve. The number provided for at the breakfast will depend on the seating capacity. Six is a good number. Waitresses will proceed to serve the meal as given in first part of lesson.

At the end of the meal, if there is time, the method of clearing the table may be noted.

A few minutes at the beginning of the lesson will be devoted to the division of work among the pupils. Where there is need of proportions, as in cereals and chocolate, supply them. Select a quick-cooking cereal so that it will take only a little more than half an hour to prepare the meal. This will leave sufficient time for serving. Things connected with the serving may be discussed during the meal. If thought best, the persons served at the table may be changed once or twice.

PLANNING A MEAL

Lesson XXX

The students should review the classes of foods, and give examples. They should learn the use of each food in the needs of the body. From foods cooked in class, select dishes suitable for a meal. Suppose that ten persons are to be served. Review setting of table, serving, and dishes required, and master all details.

Let the pupils write down the menu as selected and see that they plan a well-balanced meal. Then from their note-books let them decide the size of recipe to use for each dish for that number of persons. From that they can make out the order for the butcher, grocer, etc. As they discuss it, let them make note of it, At the end add up each amount required and make out the order. Let them practise and discuss setting the table and serving. Have the table set with the dishes to be used for this meal. Let each child set one place if there is time, or let some be critics. Then let some sit down and others pass things on a tray. Discuss with all the way to serve that meal.

Afterwards go back to the laboratory and have the pupils make out a list of all dishes, linen, etc., needed for this meal, and if not provided with all, decide who shall bring the various articles needed. Let them decide color of flowers, table decorations, and everything else, as far as possible. Appoint to each girl her duty: certain ones to wait on the table (it is easier to have the same two or three throughout); others to cook certain dishes and to see to putting them on serving-dishes; others to act as go-betweens for the cooks and waitresses, to facilitate the work of the waitresses; others to set the table, etc. When this lesson is over each girl knows exactly her duties and just what she is to bring. (I let my pupils order flowers, ice and small things, and I send in the large orders.) Let them understand that all are to put the laboratory in order, or appoint certain ones to do certain parts of it after the meal is served.

Make a great point of planning simple meals for the home, giving their cost. Have pupils plan simple, nourishing meals, and see what may be done at a minimum price.

LEMON JELLY

Lesson XXXI

Gelatine. The source of gelatine in general is the skin of all animals, tendons bladders of fish, bones, horns, hoofs, etc. There are three forms of economical gelatine,—isinglass or fish-glue, glue, and gelatine proper.

Fish-glue is a whitish, dry, semi-transparent substance, which comes from the sound or swimming-bladder of some fish, as the sturgeon. The finest comes from Russia. These parts are steeped in water and the product is dried in different shapes, to which are applied different names. It is used in jellies, confections, and for clarifying liquids.

Glue is common in impure gelatine obtained from animal substance, especially from parings of ox or other thick hides, ears of oxen and sheep, skins of rabbits, hares, cats and dogs, parings of leather, parchment, old gloves, etc. It is steeped with lime-water to remove blood and fatty parts, and is then dried and stored. After washing, it is put into vats in an open boiler with water, and thus the gluey parts are dissolved from the leather. Samples are taken and tested in water to see if they are clean. If heated at or above boiling-point too long it loses the power of congealing. Boiling separates the impurities; after the glue has solidified it is sliced and dried for several

days. It is transparent and has glassy fracture. It is used as cement for joining wood, etc.

When any connective tissue, including bone-cartilage and gristle, is boiled for a long time, a solution is obtained which when cooked forms a jelly. Half of the solid parts of the animal are convertible into gelatine by boiling with water. Calves' feet produce gelatine on comparatively little boiling, older parts on more boiling. Parts of an old animal are not so soluble as of the young. From the several connective tissues various gelatines are then obtained. From ordinary connective tissues we get collagen, from bones ossein, from cartilage choudrin, from superficial tissues (skin, nails, etc.) kreatin; all are forms of gelatine. The species of gelatine fibroin is obtained by boiling spiders' webs, silk of silk-worm, etc. Both tissues are liquid in the animal and solidify on exposure. Fibroin is also found in fibres of sponges. Chutin is the basis of bodily structure in insects. It forms the skeleton of crabs and lobsters and is not so soluble as gelatine of meats.

Preparation of Gelatine. The parts are cleaned, cut small, and then boiled with water for some time. Attention is paid to the purity of the product. It is sometimes purified with charcoal or with ox's blood. The albumen of blood coagulates, rises as scum, and carries with it the impurities.

Uses of Gelatine. Gelatine is used as food in form of natural gelatine of soup stock and also for prepared gelatines. In the arts, as in paper-making, it is added to pulp, and the whole is rolled into sheets and dried. It serves to hold pieces together. It is used in painting, printing, and in carbon photography.

Composition of Gelatine. Gelatine is nitrogenous. In composition it resembles albumen, but it contains less sulphur and more nitrogen. The proportion of nitrogen to carbon is 4 to 11.

Nutritive Value. For purposes of nutrition the gelatinoids are inferior to albuminoids, although they are easily digested and so are often given in convalescence. In combination with albuminoids they have a food value. Pure gelatine alone does not support life. Dogs fed upon it die of starvation. Gelatine does not form muscular tissue, but it economizes the albuminoids.

Since gelatine extracted from bones is identical with that from other parts (bones being richer in gelatine than other parts) and since bones yield two-thirds of their weight of it, it is an advantage to make them serve as nutrition in the form of soups, etc. However, a proper proportion of the other principles must be supplied, viz., $\frac{1}{4}$ meat soup to $\frac{3}{4}$ gelatine soup. Gelatine alone requires something to make it digestible, for it is too neutral and too insipid to set the digestive juices at work.

Properties of Gelatine. When pure, gelatine is tasteless and odorless, insoluble in cold water, soluble in boiling water and dissolved at 200°, solidifies on cooking, is decomposed by much boiling and then will not solidify on cooking; therefore it should not be cooked.

Purchasing of Gelatine. Cox's gelatine makes a clear jelly, but it softens slowly and requires a strong flavoring like wine or jelly to disguise the fishy taste. Nelson's and Knox's are of fine quality, soften quickly, and have an agreeable flavor. They are well adapted to cream and other delicate dishes. Knox's is un-

usually pure, being made from calves' heads. It is also granulated. There are 4 tbsp. in 1 box of Knox's granulated gelatine.

Lemon Jelly — Home Recipe. 2 tbsp. gelatine or ½ box Knox's gelatine, ½ c. cold water, 1 c. sugar, ½ c. lemon juice, 1 c. hot water.

School Recipe. 1 l. tsp. gelatine, 1 tbsp. cold water, 2 tbsp. boiling water, 1 tbsp. lemon juice, 2 tbsp. sugar.

Method. Soak gelatine in cold water, if shredded, from 10 to 15 m. If granulated, 3 to 5. Add sugar to boiling water and pour over the gelatine. Add lemon juice. Strain into a jelly-mould and set on ice, or in a cold place to stiffen. Fruit or nuts may be added to lemon jelly, and jelly may be made of any fruit juice, with the fruit cut, crushed and added to it. Coffee or wine may be used when fruit is added. Pour in a layer of jelly and when that is firm, moisten pieces of fruit in liquid jelly and make the pattern; then pour in the rest of the jelly.

Coffee Jelly — Home Recipe. ½ box gelatine, ½ c. cold water, 1 pt. strong coffee, ½ pt. boiling water, ¾ c. sugar.

School Recipe. 1 tbsp. gelatine, 2 tbsp. cold water, ¼ c. coffee, ¼ c. boiling water, 2 l. tbsp. sugar.

Method. Soak gelatine in cold water. Add boiling liquid and sugar, strain. Serve with cream.

Gelatine. Gelatine is an easily digested dish and an easy dessert dish to prepare. It may be prepared in a variety of attractive forms and served, with cream or without, in place of pudding with dinner, supper, or lunch. It may be flavored with lemon, fruit, fruit juices, coffee, wines and a number of other things.

An advantage as a dessert is the fact that it may be prepared early and is out of the way when the rest of the dinner is cooking.

Notes

In making coffee jelly at home, the coffee which is left from breakfast or dinner may be used.

Read lessons on coffee and lemon jelly in first-year course.

Attention should be called to both methods of making coffee. Before pupils start to make the coffee, they should put the gelatine soaking. If it soaks longer it dissolves much more easily in the boiling liquid.

Order of Lesson

1. Experiments to see the effect of cold water and hot water on gelatine and the effect of cooking on the solution.
2. Discussion of recipe.
3. Practice.
4. Three forms of gelatine. Source of each, with special attention to source of gelatine and general principle of its manufacture.
5. Purchasing of gelatine in two forms — granulated and shredded. The advantage of the former is that it softens and dissolves more quickly.
6. Variation of recipe. Either lemon or coffee jelly may be made.

BROILED BEEFSTEAK

Lesson XXXII

When the whole piece of meat is to be eaten, it must be cooked so as to retain all the juice. To do this expose it for a short time to intense heat, to

harden the albumen on the outside and so seal up the juices, and then reduce the temperature to complete the cooking of the juice.

A Good Beefsteak. The lean of good beef is firm, elastic, dark red when first cut, and bright red after exposure to the air. Really tender cuts are fine-grained and mottled with fat. Straw-colored fat extends over the rib and loin cuts. The suet is white and crumbly. The best cuts for broiling are steaks from the loin of beef (short, porterhouse and sirloin).

Method of Broiling Beefsteak. When the steak is brought to the house, take it from the paper, wipe off with a damp cloth, place it in the refrigerator or in a very cool place. If a coal stove is in use, have the coals hot but without flame or smoke. Grease a broiler with beef fat, have it hissing hot, place the steak on it, and hold it near the coals. Count ten slowly, turn the broiler and hold the other side down for some time. Then turn every 12 seconds for about 1½ minutes, or until the outside is well seared. Now hold farther from the fire and turn until the steak is brown, or longer if it is liked well done. Just before finishing browning, sprinkle with salt and pepper, and turn once, so that the seasoning will cook in. Have ready a hot platter. Place the steak on it and spread both sides with butter, or with Maître d'Hôtel butter. Garnish with water cress or parsley, and slices of lemon. Serve at once.

If a gas stove is used, have the broiling-oven hot. Place meat in a double broiler, or on the rack over the pan. Turn as in broiling over coals, but not so often. Turn gas down and lower the pan after the meat is seared. To cook a steak one inch thick, five or six

minutes are required. For one 1½ inches thick, eight to ten minutes are required.

Well-broiled steak is puffy, as the moisture expands into steam, and is well-browned, juicy and red on the inside. If steak is less than one inch thick it loses so much water by evaporation that the inside is dry before the outside is brown.

Steak cooked on a pan may be almost as well-flavored and juicy as broiled meat, if it is properly done, but a cast-iron pan, not sheet-iron, must be used. Let the cast-iron pan become almost red hot before putting meat into it. Rub over the surface of the pan with a piece of fat taken from the steak. Now place steak in pan and sear one side, and then turn and sear the other side. Keep turning until it is done. If any melted fat collects in the pan pour this off. Season and serve like broiled steak.

Recipe for Maître d'Hôtel Butter. ½ c. butter, 1 tbsp. lemon juice, ½ tsp. salt, few grains of pepper, 1 tbsp. parsley cut fine.

Method. Cream the butter and stir in the other ingredients.

Notes

Review the principle of tender-meat cookery.

This lesson may be given as group work, having two or three girls for the class. Or, better still, have each girl cook a small piece of steak, and then let two girls cook a large steak before the class.

Order of Lesson

1. Review of principle of tender-meat cookery.
2. Talk on how to select a good beefsteak.
3. Discuss carefully the method of broiling beefsteak.

4. Compare process with pan-broiling.
5. Work.
6. Serve steak with wafers.
7. Wash dishes.
8. Review discussion, if there is time.

BOOK II

PRESERVATION OF FRUITS

Lesson I

In preserving, the most important steps are sterilization of the foods and utensils used. It is necessary to seal the foods to exclude all germs. Scientists have found that if food is perfectly sterilized, and the opening of the jars filled with sterilized cotton, food will not ferment, for bacteria cannot pass through the cotton.

Food spoils because of bacteria development. Bacteria grows very rapidly in foods rich in nitrogenous substances, if warmth and moisture are present. Such nitrogenous foods are meat, fish, eggs, peas, beans, milk, etc. These are difficult to preserve.

Fruits are usually slightly acid and do not often support bacterial growth; therefore canned fruits are more commonly fermented by yeasts. Some vegetable foods that have much acid and very little nitrogenous substance are easily preserved.

Canned fruits, if no bacteria is left, and all the utensils have been properly sterilized and the fruit properly sealed, will keep a year or even longer, although all canned fruits undergo gradual change and will deteriorate, even under the best of conditions. If fruit is canned or preserved with a large amount of sugar, — one pound of fruit to one pound of sugar, — it need not be hermetically sealed, be-

cause the sugary syrup that is formed will not be affected by bacteria and yeasts.

In canning, preserving and jelly-making, food should be protected from moulds as well as from bacteria and yeasts. Utensils used in preserving foods are liable to contain organisms like bacteria, yeasts and mould, so all must be sterilized; that is, all life and source of life upon them must be destroyed. Pans, spoons and strainers may be placed on the flame in cold or boiling water and boiled 10 or 15 m.; glasses, bottles, jars, and covers should be placed in cold water and gradually heated to the boiling-point, and then boiled 15 m. Take the jars out one at a time as they are to be filled.

Never use iron or tin utensils, as the acid in the fruit acts upon them and gives a bad taste and color to the fruits. Kettles should be lined with porcelain or enamelled. Broad kettles are better than deep ones. Scales, especially in preserving foods, are almost necessary in every kitchen. A wire basket saves time and strength, as the fruit to be peeled can be put into the basket and lowered into a deep kettle, half filled with boiling water. Leave the basket in the boiling water a few minutes and then plunge it for a minute into cold water, and the fruit is ready to peel.

Selecting and Preparing Fruit. The flavor of fruit is best when it is fully ripe, but to be canned it is best just before it is ripe. It is better to use fruit a little under-ripe than over-ripe, as in soft fruits fermentation follows upon the perfectly ripe stage. Freshly picked fruit is best for canning, preserving and jelly-making. Imperfect fruit should never be canned.

Cut out bruised places in peaches and pears. In canning berries, choose those that have a small number of seeds. When fruit is first brought to the house, put it where it will keep cool.

Prepare only as much fruit as you can cook while it keeps its color and freshness. Have sugar ready before beginning to peel. It is well to be systematic and have two bowls ready — one for the sugar and one for the fruit — which will hold the same quantity of each. As you peel or hull the fruit, drop it into the bowl, and when this measure is full put sugar and fruit into the kettle. While this is cooking, prepare another measure and place in a second kettle, etc.

All large and hard fruits should be washed before peeling. Rub quince with a coarse cloth before washing. Wash all small fruits and berries before hulling them. A huller is better than the fingers for hulling berries.

Canned Fruit. This is the best and most economical way of preserving fruits. Canned fruit is the most easily digested because the fruit is kept in a soft and juicy condition. There are several methods of canning, but the principle is the same. The processes are: cooking fruit in jars in an oven; cooking fruit in the jars in boiling water; or stewing the fruit before it is put into the jars.

Have the jars, covers, and rings perfectly sterilized and in good condition. Use only new rings each year, or the sealing will not be perfect. For small families, use the pint jars. Purchase those with tight-fitting covers and fit them with new rings. Test the jars by fitting each with a ring and cover, pour

water into them, and invert them to see if they are air-tight. If not, do not use them.

Canned Peaches — Recipe. 8 qts. peaches, 1 qt. sugar, 3 qts. water.

Method. Place sugar and water together, and stir over the fire until the sugar is dissolved; when the syrup boils, skim it. Place the kettle on back of range where it will keep hot but not boil. Pare the peaches and cut in halves; or the fruit may be canned whole. Put one layer of the peaches in the kettle and cover with some of the hot syrup. Let the fruit boil gently for 10 m. Skim as it comes to a boil. Place in jar and seal. If fruit is under-ripe, it may need longer cooking. It should be tender enough to be pierced with a silver fork or a knitting-needle.

Pears, cherries, apples, and plums may be canned in the same way.

Canned Fruit Cooked in the Oven. Cooking in the oven is the method of canning fruit to be preferred. The work is easily done and the fruit retains its shape, color and flavor better than when cooked in the kettle. If asbestos is available, cover the bottom of the oven with a sheet, the kind used in covering furnace pipes. This can be obtained at plumbers' shops. If asbestos is not to be procured, place in the oven shallow pans containing 2 inches of boiling water.

Sterilize all jars and utensils, make the syrup and prepare the fruit, in the same way as for cooking in the kettle. Fill hot jars with it and pour in enough syrup to fill the jars solidly. Using a silver-plated knife, run the blade around the inside of the jar. Put the jar in the oven, either on the asbestos or in the pan of water. The oven should be moderately

hot. Cook fruit about 10 m., remove from oven, and fill jar with boiling syrup. Wipe and seal jar. Place the jars on a board, out of draft of air. Tighten screw-covers after glass has cooled.

Large fruits, such as pears, peaches, quinces, etc., will require about 1 pt. syrup to each quart jar of fruit. Small fruit will require a little more than a half pint of syrup. The amount of sugar varies according to fruit to be used.

Direction for filling Jars. Have a shallow pan with about 2 inches of boiling water in it. Set this on the stove. Put a broad skimmer under a jar and lift it from the boiling water and drain. Now place the jar in the shallow pan and fill to overflowing with the boiling fruit. Put the handle of a spoon around the inside of the jar to pack the fruit solidly; this also takes heat from the fruit and will keep the jar from breaking. Put a rubber ring into the boiling water to sterilize it, put it on the jar, put cover on, and fasten. Place the jar on a board upside down, out of a draft of air. It may be well to tighten covers after the jars have become cold. After fruit jars are cold, wipe them with a wet cloth. Place the labels, and put in a cool dark closet.

Notes

Girls may use either method, the teacher deciding which is more convenient for the equipment in use; but give the girls both recipes.

Have two girls work together and can 1 pt. of fruit. Of course, if preferred, each girl may can her own individual pint. It is always better for each girl to do all of the process if possible.

ORDER OF LESSON

1. Discuss sterilization of foods, utensils, etc.
2. Selection of fruits discussed.
3. Preparation of fruits for canning.
4. Method of canning peaches.
5. Recipes.
6. Work.
7. If possible have pupils can fruit at home, in the fall, and report.

JELLY

LESSON II

Jellies are made of cooked fruit, juice and sugar. Usually the proportions are equal. When fruits are ripe or nearly ripe, pectin — a carbohydrate, something like starch — is found. This property in fruit juice enables us to make jelly. When equal quantities of sugar and fruit juice are combined and heated to the boiling-point, the pectin in the fruit causes the mixture to harden.

The chief reason that housekeepers have trouble in making jelly is because they do not understand when this pectin is at its best to harden the mass of cooked fruit and sugar.

Pectose and pectase are in unripe fruit. As the fruit becomes ripe, the pectose acts upon the pectase, which is insoluble in water, and changes this into pectin, which is soluble. Pectin is best when fruit is just ripe, or perhaps a little before it is ripe. Should the juice ferment, or the jelly cook too long, the pectin loses its hardening power. It is very important that the fruit should be fresh, just ripe or

a little under-ripe, and that the mass shall not be boiled too long. The quantity of pectin, sugar acids, and gums in fruit vary. Currants have four or five times as much sugar as peaches.

Acid fruits are the best for jelly. In strawberries the quantity of pectin is so small that it is hard to make jelly of them. Currant juice may be added to juice of strawberries and a good jelly made. Acid fruits that make good jelly are the following: currants, crab-apples, quinces, grapes, blackberries, raspberries, and peaches.

If fruits that are juicy are gathered just after a rain, they will absorb too much water, and so it will be difficult to get their juice to jelly unless boiled a long time. Boil the large fruits, such as peaches, pears and apples, until soft. Strain the liquid, which will contain the pectin. It is easier to make jellies from juicy fruits than from those to which water must be added.

Jelly is better if fruit is allowed to simmer gently and not stirred. Strain jellies through cheese-cloth without squeezing. Fruit that contains a large proportion of sugar should have a smaller quantity of sugar added to it, as otherwise the jelly will crystallize. During cold and damp seasons there is less sugar in fruits than in dry and warm seasons.

Rapid boiling of jelly is apt to cause it to crystallize or candy, as the parts are thrown on the sides of the kettle where they form crystals which get into the mass.

Currant Jelly. 1 pt. juice, 1 pt. granulated sugar.

Method. Separate currants from leaves and large stems. Place in a kettle, crush a few with a wooden

masher. Heat slowly. Stir often. Crush all with masher. Place a sieve or strainer over a large bowl and over this place a double fold of cheese-cloth; let the mass drain, but do not pierce or squeeze it through. The part that does not go through without pressure may be used to make what is called second jelly. Measure the juice and place it in a clean porcelain kettle. To each pint of juice, add 1 pint of granulated sugar. Stir until sugar is dissolved and place over the flame. When it boils, skim, place over the fire, and boil and skim again. Do this a third time. Now pour into hot glasses, taken from a pan of water on the stove. Place on the window-sill where the sun comes in; cover with glass sheets, if possible.

Covering. Have round pieces of white paper, cut the size of the top of jelly glasses. When the jelly is hard brush over with alcohol. Now dip a piece of the white paper in the alcohol and place on the jelly. If the glasses have covers, place them on, or cover with larger pieces of paper and paste down on sides with white of an egg mixed with 1 tbsp. of cold water. It is better to use covers of tin.

If paraffin is used, have the coating about $\frac{1}{4}$ inch thick. If too thin it will crack and leave the jelly exposed.

ORDER OF LESSON

1. Discuss the making of jelly.
2. Discuss pectin, pectose and pectase.
3. Emphasize the importance of knowing why jelly-making is not successful.
4. Recipe discussed.
5. Work.
6. Review of discussion, if there is time.

COMBUSTION, FUELS AND FIRES

Lesson III

Combustion. A flame burns more brightly when there is a strong current of air. This may be seen by comparing the flames of two candles, one burning in air, the other arranged with an inlet and outlet for the air draft. The direction of the draft is upward. In a lamp, air enters at the bottom and goes out at the top of the chimney. To see this, hold tissue-paper above the chimney and near the space at the base of chimney. If there is no inlet for air, the flame will soon go out for lack of oxygen. If the outlet is shut, there will be no draft, and the flame will be extinguished.

The oxygen in the air is necessary to support combustion. A lighted match will go out in air from which oxygen is absent.

The fire in the stove is in many ways similar to the flame in a lamp. Stoves are comparatively recent household conveniences. Long before stoves were known, people cooked before an open fire or buried their food in hot ashes. The stove and the things necessary to it came only gradually into use.

The essential parts of the stove are the fire-box, grate, ash-pan, oven and pipe.

Laying a Fire. To build a fire it is necessary to have fuel — paper, wood, coke or coal — and the match with which to ignite it. The fuel is placed in the order given, paper first, so that the fuel most easily ignited is nearest the inlet of air, and the

draft passes up through the other fuel. Nothing can burn without heat. Some substances require more heat to ignite them than others.

The match is a piece of wood with sulphur or phosphorus at the end. Sulphur and phosphorus cannot burn when cool. The heat which starts the flame of the match is produced by the rubbing or striking of the match against a rough surface. The friction raises the temperature of the sulphur or phosphorus and produces combustion. Coal could not be used at the end of a match because it does not burn at a low temperature. Friction is not sufficient to set wood on fire and for this reason sulphur, which ignites easily, is used. The sulphur flame produces enough heat to ignite the wood of the match, that is, to raise it to the temperature at which it burns. Matches are not sufficient to raise a large amount of wood to the temperature required for combustion, so we use paper as a medium to bring that about. The wood in turn heats the coke and coal to the temperature at which it ignites, and the fire in the range is the result.

Since air is necessary for combustion, and burning ceases when the air is shut off, it is necessary to furnish a supply of air to support a fire. The dampers regulate the air supply and draft. The air enters at the bottom, passes through and over the fire and out at the chimney. Paper and wood for the fire must be so arranged as to allow a free passage of air through them and thus reach the fuel above. For this reason the paper should not be left folded but should be crumpled, and the wood and coal arranged loosely so as not to stifle the fire at the start.

The fire at first must have encouragement, and the dampers should be wide open to allow the air to go up the chimney. The oven damper checks the draft and therefore should be open until a brisk fire is going. If it is then desired to use the oven, the circulation must be checked and the hot air turned over the oven by closing or partly closing the oven damper. The damper in the pipe should likewise be open when the fire is starting.

If there is a free circulation after the fire is well started, the fire will not last long. It must then be checked by closing some of the dampers. This checks the fire by reducing the supply of air and decreasing combustion. The fire should not be checked until a good bed of coal is well started. All the coal for the fire should not be put on until a first layer of it is started; then more can be added.

The fire may be checked in various ways, — by closing the damper in front, by closing that in the pipe or the oven damper, and by removing the stove cover. If the dampers are closed, the supply of air is diminished, thus checking combustion. If the cover is removed, cold air is let in directly on top of the coals and the air should be supplied from below. Dampers differ in different stoves, but the principle in handling them is the same in all. Economy may be learned by understanding the use of the stove and regulating it accordingly; that is, by checking it when a hot fire is not needed.

Every stove needs care and attention. The grate must be kept free from ashes to allow proper circulation of air.

Notes

The building of the fire will be done by various pupils, while the class stand around the range. The fire should be lighted, in order that pupils may have practice in the care of one newly made. If it seems extravagant to light the fire and not use it for cooking, the fire may be built and not lighted, and at the next lesson it may be arranged to have a newly-built fire for the pupils to manage.

It will be found helpful to have the diagram of the range on the board to help in the explanation, since this may easily be seen from any part of the room.

Fuels: Read notes in Book I and in Parloa's House Economics, pages 134–6; Wilson, 39-47; Williams and Fisher, 20–3.

Fires and Ranges: Read notes in Book I on the subject, Wilson 47–55, Williams and Fisher 11–20, Parloa 136–147.

Diagram of ranges will be found in Parloa, pages 142–3, and in Williams and Fisher, page 14. These will be found helpful in explaining the working of the range.

Attention might be called to the fact that the air in which lights have been burning becomes impure. Explain why the air grows stuffy in the evening when the lights have been burning for some time and there is not enough fresh air coming in. There is in the air of the room a gradual increase in the amount of carbon dioxide, the gas which is formed when burning takes place. This gas, in large quantities and in large enough amounts, is poisonous to breathe. The gas in the air we breathe is the same gas in the air which supports combustion.

EGGS

Lesson IV

To prepare a soft-boiled egg appears to be a very simple thing. In reality it is seldom properly accomplished, at least with such a degree of nicety that the result satisfies exacting tastes. A well-prepared soft-boiled egg is a most nourishing and appetizing dish for an invalid. One poorly prepared is not appetizing and sometimes is not nourishing. After the egg is dropped in the water, whether in the shell or not, the water should not boil. The albumen of the egg coagulates at a temperature a little below the boiling-point and even a little below the simmering-point. The egg, if given a little time, will become cooked through so that it can be called a soft-cooked egg at this temperature. The water may be boiling when the egg is put in, but it should not be allowed to boil afterwards. Boiling, even for a short time, makes the white tough, and thus the egg loses in nourishment.

Soft-Cooked Eggs — Recipe No. 1. Allow 1 pt. water for 2 eggs. When the water boils, lower the eggs into it with a spoon. Remove at once from the fire and let it stand covered about 6–10 m.

Recipe No. 2. Place eggs in saucepan. Cover with cold water, bring water slowly to a boil, and let it boil a few seconds.

Recipe No. 3. Eggs in a Nest. Separate the white of an egg from the yolk. Beat the white stiff and

dry; put it in a cup or small bowl, making in the top of it a hollow the size of the yolk; into this hollow slip the yolk. Cook in a covered saucepan containing boiling water until the top of the white is firm (about two minutes). Serve in the cup.

Notes

Egg recipes are not very accurate, as in different cases it will take the water different lengths of time to boil.

For practice work, the teacher may put 2 eggs in the shell in boiling water and leave one in for 3 m., the other for 10 m. Compare results. Meanwhile each pupil is cooking one egg in shell according to Recipe No. 1. Have each pupil examine carefully her egg and the other two eggs, and compare.

Review Egg Tests in Book I.

Refer to Egg Lesson in Book I. Pupils may be told the week before to look up the subject of eggs and to study the notes they have for that lesson in the first-year course. The principles then established should be reviewed and perhaps others added. There is no need to repeat facts.

If time permits, the following simple test for cooking eggs may be tried by a group of pupils or by one pupil or the teacher. If there is not time, pupils may try this at home and report the following week.

Place a little of the white of egg in a test tube; hold test tube and chemical thermometer in a pan of water. Heat the water gradually. Notice how the white of egg looks at 150° F., at 180° F. Stir with a stick to show degree of solidity. Notice appearance and solidity at 212° F. Keep the water boiling for

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COOKING EGGS AND MAKING TOAST.

several minutes: then take out some of the white of egg and examine it.

ORDER OF LESSON

1. Kingdom and class to which eggs belong.
2. Parts of the egg.
3. Composition. What food principles contained? Lacking in what?
4. Nutritive value as compared with other foods. With what foods should eggs be served?
5. Tests for fresh eggs. Review first year's lesson.
6. Care of eggs. Preservation.
7. Use of eggs.
8. Cooking of eggs.

CEREALS

LESSON V

Scarcely a breakfast is considered complete without a cereal, and cereals such as rice, tapioca, etc., are frequently used at other meals.

The use of cereals is largely a matter of taste. Some prefer raw cereals, others those which are cooked. In recent years many new cereals have come into the market, ready for the table, some partially cooked and predigested. All varieties of grains are used in the various preparations.

The name cereal comes from Ceres, the Greek goddess of the harvest. The name was given to grain and grasses, the seeds of which are used as foods. Wheat, Indian corn or maize, oats, rice, rye, and barley, are the grains from which flour, meal and different cereal products are made.

The products of wheat are the meals, white flour,

entire wheat flour, graham meal and the cereal products, Pettijohn's breakfast food, pearl wheat, rolled wheat, cracked wheat, farina, and cream of wheat. In like manner, from each cereal there are many preparations.

Cereals grow in different climates, from cold regions where barley is raised, to warm climates, the southern states and India, where rice grows. They are threshed, winnowed, hulled and ground for the market.

Cereals are very nutritious and cheap food. They must be thoroughly cooked. The time allowed in the recipe on packages of cereals is usually not sufficient. They contain much cellulose in proportion to other ingredients, and for that reason require long cooking, The nature of the starch grains of each cereal makes a difference in the time of cooking. Cooking, as well as softening the cellulose, also develops the flavor, bursts the starch cells, and softens the gluten. The fireless cooker is very good for cooking oatmeal.

Cereals should generally be cooked in a double boiler, and in boiling salted water. They may be cooked first directly over heat for 10 or 15 m., and then placed in a double boiler. In this case they require watching at first.

Cereals may be served hot or cold, boiled, steamed or fried, in cakes, muffins, puddings, etc. They are more digestible when eaten with fruit or bread, — something which must be masticated.

Cream of Wheat — Home Recipe. Put the water for the cereal with the salt in the top part of the double boiler, and place it directly over the heat; when this water boils, stir in the cereal gradually; put the two

parts of the double boiler together, and cook until done. To hasten the cooking of the cereal, cook it directly over the heat for 10 or 15 m., and then cook in double boiler till done. Cereals requiring long cooking may be soaked first in cold water. Cereals require thorough cooking. Oatmeal should be cooked 10 or 15 m. by direct heat and then from 45 to 60 m. in double boiler.

School Recipe. Cream of wheat, ½ c.; water; 1 r. tsp. salt; 1 r. tbsp. cereal.

Notes

COMPOSITION OF CEREALS

(Department of Agriculture, Washington, D. C.)

	Proteid	Fat	Starch	Mineral Matter	Water
Oatmeal	15.6	7.3	68.0	1.9	7.2
Cornmeal	8.9	2.2	75.1	0.9	12.9
Wheat flour (spring)	11.8	1.1	75.0	0.5	11.6
Wheat flour (winter)	10.4	1.0	75.6	0.5	12.5
Entire wheat flour	14.2	1.9	70.6	1.2	12.1
Graham flour	13.7	2.2	70.3	2.0	11.8
Pearl barley	9.3	1.0	77.6	1.3	10.8
Rye meal	7.1	0.9	78.5	0.8	12.7
Rice	7.8	0.4	79.4	0.4	12.4
Buckwheat flour	6.1	1.0	77.2	1.4	14.3
Macaroni	11.7	1.6	72.9	3.0	10.8

The time for cooking cereals is ½ hr. to 6 hrs., depending on age, preparation, etc. The amount of water varies from two to five times the amount of cereal used.

Serve the cream of wheat in class with milk and sugar, or, if you prefer, pour it into a little dish or mould into which has been put pieces of dates or figs. Let it cool and serve cold with milk and sugar. If

the pupils cooked boiled rice the first year, leave the cereal plain the second year.

Refer to Cereal Lesson in Book I. This lesson is a review of the cereal lesson of the first year, taking up another kind of cereal and another way of serving.

For the composition of cereal see the notes of the first-year course. Put a table of composition of different cereals on the board before class. What food elements are lacking? Which the largest proportion? Are they good foods? Hearty or simple? Are they concentrated, compared to potatoes and many other foods?

Oatmeal is much heartier than the cereals made from wheat or rice, which have a smaller amount of fat. Oatmeal is better for the out-of-door laborer than Wheatina; it is heartier and takes longer to digest, — i. e. stays by him longer. Oatmeal is a better food for winter than Wheatina because it contains more fat. Fat gives heat, so that food rich in fat is not a good summer food. Cereals are nutritious, for they contain starch, cellulose, gluten, fat, salt and water. Potatoes have a large amount of water and very much less of the food principles than the cereals; hence cereals are heartier foods than potato.

Have the general composition of cereals written on the board for pupils to put in their note-books.

Composition of cereals — general: water 13%, proteid 8–13, fat 1.9–5.2, starch 58–77, cellulose 6–11, mineral 1–3.

Suggest the fireless cooker for all cereals.

Order of Lesson

1. Classification of cereals. What are they?
2. Examples of cereals.
3. Preparation of seeds for market. (Refer to Book I.)
4. Composition and food value of cereals.
5. Cooking of cereals.
6. Serving cereals.
7. Discussion of recipe.
8. Practice work and dish-washing.

MACARONI

Lesson VI

Macaroni, vermicelli and spaghetti form cheap, inexpensive dishes for dinner or lunch and may be used as substitutes for starchy vegetables. They are usually served with a sauce — white sauce, tomato sauce, or sauce containing other ingredients — as otherwise they are insipid to the taste. They may also be baked with cheese.

Before adding the sauce, macaroni must first be cooked, for starch is indigestible when raw. Heating and moisture make the grains of starch swell so that they burst the cellulose about them and soften in the water.

When tomato juice is used as a sauce with macaroni, it is thickened by using flour. Butter, mixed with the particles of flour, distributes the flour and ingredients throughout the mixture. Flour and butter in a mixture are sometimes called the binders, because they bind ingredients together. Dry flour, if added to sauce, would lump. Cooking of flour is necessary to cause thickening.

Macaroni with Tomato Sauce — Home Recipe. 1–1½ c. tomato juice, ¼ lb. macaroni, 1 c. crumbs, and ¼ c. butter to mix with the crumbs.

School Recipe. ¼ c. tomato juice, 3 sticks macaroni, 2 l. tbsp. crumbs (dried bread), ⅓ l. tbsp. butter (or ½).

Method. Use crumbs enough to cover the top of dish well, for the baking changes the amount given here. The melted butter may be mixed with crumbs and spread over the dish, or spread on crumbs with pieces of butter on top.

For recipes, see Lesson IV in the first-year course.

Notes

Each pupil should perform the whole process if possible, even if she has to cook the macaroni and set it aside while making the sauce. Use small bowls or earthen moulds and bake together in the oven (on large pan if desired).

Pupils may be told the week before to look up the subject of macaroni and be prepared to answer questions about it.

If time allows at end of lesson, try experiment in composition of flour (given in Lesson IV, Book I). Wash out gluten; emphasize amount of gluten (proteid) necessary in flour for macaroni. If there is not time, do this at the next lesson.

Order of Lesson

1. Class? Tests? Food principles?
2. From what made and where?
3. Other forms of paste.
4. Value as food.
5. How to buy.

DOMESTIC SCIENCE IN A SCHOOL FOR THE DEAF.

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6. Discussion of recipe. How cooked and served.
7. Practice work.
8. Dish-washing.

ROAST BEEF

LESSON VII

Roasting is cooking in the heat of the oven. In times past the term roasting was applied to the cooking of meat and other things before an open fire. The term baking is used in connection with cooking of flour mixtures in the oven.

In preparing a roast, the meat is dredged with flour. This, with the fat used in basting the meat, forms a crust which helps to keep in the juice. The heat should be intense at first to make a crust of flour and albumen on the outside of the meat, which hardens with heat. After that, the heat may be reduced. If meat were put into a moderate oven, the heat would be insufficient to harden the albumen. The meat would then become dry and tasteless from evaporation of the juices. Hot melted fat, in basting, helps to pass the heat inside so that the meat is cooked in the steam from its own juices.

The sirloin and porterhouse roasts, the rolled ribs, and the most tender parts of the rump and loin ribs are the best cuts for roasting. In serving, a roast should be cut across the grain.

Roast Beef — Home Recipe. Wipe and rub all over with salt a five or six pound piece of beef. Place on a rack in a meat-pan. Skim down and dredge meat and pan with flour. If the roast is very lean, put juices of fat beef in the pan.

It is better to rub with flour and sear the outside first in a hot oven and then rub with salt, pepper and add beef fat. Now lower the temperature and baste every ten minutes with the melted fat. When meat is about half done, turn it over and dredge with flour. When well roasted outside fat is crisp and brown and the lean under the skin is browned to the depth of about a quarter of an inch. If liked well done roast about one and one-half hours. One hour if liked rare. A little hot water may be added to prevent fat in pan from burning.

Small roasts require a little hotter oven than a large roast. A good way to sear a small roast is to hold each part of its surface on a hot griddle or frying-pan; then less heat is required. Beef is basted to retain the juice, as the fat and flour form a crust and prevent juices escaping.

Gravy. Pour or skim off most of the fat from the liquid left in the pan. Put pan on the stove. Add about 3 tbsp. flour, or as much as will absorb the fat. Then add gradually hot water or hot stock, about 1½ c., and stir as it thickens. Cook 5 or 6 m., season, and strain.

School Recipe. For small roasts, a butcher will cut the meat any size you wish it. The best part of the round may be used, or any of the cuts used for roasting. The pieces for individual roasting may be about five-inch cubes, or if the pan will hold them, they may be a little larger, though not much, or they will not be done in time. Have pupils tie or skewer them for the sake of the practice.

Have as many girls as possible attend to the meat during the roasting, and call the attention of all to it. The gravy that comes from the meat when it is cut

is better than gravy made in the pan, for the latter is apt to be greasy. Let pupils understand this. I should not advise having them make pan gravy in the lesson, partly on account of the limited time.

Notes

In roasting as in boiling, the object is to sear the surface of the meat by subjecting it suddenly to intense heat and then to cook it thoroughly by long exposure to a much lower temperature. Place in oven for about one-half hour. When the outside is browned, close drafts of range to lower temperature, for a slow cooking. For a gas range, have oven burner lighted about 10 minutes before using.

There are two ways to give the lesson: 1. The teacher performs the process before the class, and prepares one roast of meat. 2. Each pupil prepares a very small roast of meat, just as the large one would be prepared.

The individual lesson should be given whenever possible, but it will be more expensive. To save money and also to save room in the oven, if it is not large enough for a small roast for each girl, have two girls prepare a roast together. The pupils will be more benefited by this method than by watching the teacher perform the whole process.

An advantage of the individual method is that the small roasts will cook more quickly. Each pupil, or two together, may follow the recipe through. The small roasts may be put together on the large roasting pans and watched by girls appointed for the purpose.

ORDER OF LESSON

1. General discussion of meats, and the cooking of tender and tough meats.
2. Point out cuts of beef on the chart and tell the nature of each.
3. What is roasting? Discussion.
4. Discussion of recipes.
5. Practice work.
6. Serving of meat with wafers, bread and butter, or at a meal.
7. Dish-washing.

BAKED POTATOES

LESSON VIII

The potato is a thick stem, growing underground, called a tuber. The potato contains about ¼ starch and ¾ water, a very little mineral, and some cellulose.

In the body it serves to furnish fuel for heat and energy, and assists in making the fat part of the body. Saliva and intestinal juices change it into sugar, which is readily dissolved.

Potatoes are not a concentrated, hearty food because of the great proportion of water which they contain. As a rule they are an inexpensive food, easily digested if properly cooked. They must be served with proteid and fatty foods.

Potatoes taken out of the ground too soon are not ripe, and if left too long after digging before they are used, the starch is partly changed to gum. They are planted in spring and harvested in autumn. For eating they are best in fall and winter. It is more economical to buy small ones, for there are more

in a bushel. They should be kept in a cool dry place and sprouts should be removed.

Baked Potatoes — Home Recipe. Select medium-sized potatoes, scrub them well and dry them. Bake them in a hot oven until soft — about 45 m. Turn occasionally, in order that they may bake evenly. For stuffed potatoes, or potatoes on the half shell, cut baked potatoes in two lengthwise, or cut a small slice from the top of each, and carefully scoop out the inside. Mash fine, add 2 tbsp. butter, about ½ c. hot milk, 1 tsp. salt, and white pepper to taste. Beat until very light. Well-beaten whites of two eggs may be added and stirred in gradually. Fill the skins with this mixture. If white of egg is used, brush over with the yolk. Place in oven, to brown the tops, about 10 m. Fine-chopped ham or parsley may be added to the potato if desired.

School Recipe. 1 small potato, ½ tsp. butter, ½ s.s. salt, 1 spk. pepper.

Notes

This potato-lesson is a review of Lesson 2, Book I. Pupils may be told the week before that they are to have a potato-lesson and may be asked to prepare potatoes in some new and attractive way. Ask them to look over their notes and recipes of the year before, that they may be prepared. It would be a good plan also to give them the directions for obtaining starch from the potato. Ask them to prepare starch during the week and bring it in a small bottle at the next lesson. Sample may be labelled with name, date, and material, and kept in the laboratory.

The baked potatoes, prepared individually, are all

put into the oven at the same time. For a label, fasten paper on with a piece of toothpick.

ORDER OF LESSON

1. Class of food, growth, and care.
2. How cook starchy foods.
3. Iodine test.
4. Composition and value of potatoes.
5. Purpose in the body.
6. Ways and economy in cooking.
7. Discussion of recipe.
8. Practice work.

OYSTERS

LESSON IX

Oysters are shell-fish, belonging to the special group called mollusks, which have hinged shells and soft bodies. Clams, mussels, scallops, etc., belong also to the group. They grow in bays and along coasts.

Among the varieties of oysters are Blue Points, New York, Wareham, Providence River, Norfolk, Lynnhaven, "selects," and Count oysters.

Oysters are not good from May to August, for they are then discharging eggs (at a rate of millions a year).

The composition of oysters is: Water 88.3%, protein 6.1%, fat 1.4%, mineral .9%; carbohydrates, especially in the form of glycogen in the liver, 3.3%.

Oysters are not a hearty concentrated food, for they contain a great deal of water. They are of value for proteids and are easily digested if not made tough by over-cooking. If cooked in liquid, the tem-

perature should be below the boiling-point, for boiling makes proteid hard and tough.

If oysters are fattened for market in water where sewage is discharged, there is danger that they may contain germs of typhoid fever. After removal from the shell they should be washed and drained on a dry cloth, always being lifted carefully by the gills. Oyster liquor is seldom used, but if so, should be strained. If oysters are in the shell, open them by inserting a knife on the side opposite the hinge.

Oyster Soup — Home Recipe. 1 qt. oysters, 1 pt. milk, 1 tbsp. butter, 2 tbsp. flour, salt to taste, ½ s.s. pepper, 2 pieces celery.

School Recipe. ½ l. tsp. butter, ½ l. tsp. flour, ½ s.s. salt, spk. white pepper, 4 oysters, ¼ c. milk, 2-inch piece celery.

Method. Wash and drain oysters. Strain the liquor and put it on to boil. Remove scum, add oysters, and simmer till they are plump and the edges curl or separate. Strain the liquor in the hot milk, and keep till oysters are hot. Melt butter and when it bubbles add flour; when the mixture bubbles add milk gradually. Add seasoning. Boil 3 or 4 m. Remove from fire, add oysters and serve very hot.

If celery is used, cut in small pieces and add to milk when put over to heat.

Scalloped Oysters — Home Recipe. 1 qt. oysters, 1 pt. soft bread crumbs, ¼ c. butter, ¼ c. oyster liquor or cream, salt and pepper to taste, 1 tsp. lemon juice.

School Recipe. ½ c. bread crumbs, 4 oysters, 1 tbsp. liquid, a few drops of lemon juice, salt, pepper or ½ s.s. mace.

Method. Wash oysters thoroughly and drain.

Heat oyster liquor to boiling-point and remove scum. Melt butter and mix it with the crumbs. Cover the bottom of a buttered baking-dish with a layer of the crumbs. Add a layer of oysters, sprinkle with salt and pepper, add crumbs again, and oysters, etc., having a thick layer of crumbs on top. Moisten with the liquid, to which may be added one beaten egg. Bake in a hot oven 20 to 30 m. Only two layers should be in the baking-dish.

Notes

A week or so before this lesson tell pupils that they are to have a lesson on oysters and that they are to find out all they can about the animal, its appearance, parts, habits, etc.

Oyster stew is made like oyster soup, without the thickening.

Additional facts are found in notes for oyster lesson in Book I. These should be drawn from the pupils.

If scalloped oysters are used for the practice work, attention may be called to the nutritive value of the dish. In scalloped oysters, starch, etc., are supplied in the bread crumbs, so that the dish is more nourishing than plain oysters. Small bowls or baking-moulds may be used.

Order of Lesson

1. What are oysters? Give class, varieties, appearance parts, habits, etc.
2. In what localities do they grow? Season for them.
3. Class of food; value as a food.
4. Preparation for cooking.

5. Name different ways to serve oysters.
6. Discussion of recipes.
7. Practice work.
8. Dish-washing.

BOILED FISH

LESSON X

A simple experiment will illustrate the best method of boiling fish. Prepare three small pieces of fish for cooking. Place one in cold water and apply heat until cooked; cook the second in clear boiling water; and cook the third in boiling water with the addition of acid and seasoning. At the end of the experiment an examination of the fish will show that the first one will be broken to pieces; the second will be whole but insipid in taste; and the third will have retained its shape better and will also have the best flavor.

The cold water draws out the juices and a scum is left on the pan. The fish is softened and broken, and the proteid is drawn out, destroying the nutritive value. Fish should never be cooked in cold water. Acid and salt in boiling water coagulate the albumen of the fish more quickly than if they are not present. There is therefore less loss of juice, and the fish has a pleasant taste due to the seasoning and retention of juice.

The water in which fish is cooked should boil gently. Vigorous boiling would break the fish to pieces. It is best to place the fish in a cloth, and thus insure it from being broken. It is done when the meat separates easily from the bone.

Handle fish as little as possible. If the fish are

small, use a saucer to pick them up to place in the cloth.

School Recipe. To the water in the small saucepan add ½ tsp. vinegar and ½ tsp. salt. Call attention to fact that it is well to serve a sauce with fish, but there is not time to prepare it in class except at a sacrifice of the discussion of part of the lesson. Egg sauce may be made at home.

Home Recipe. Add juice of half a lemon or ¼ cup of vinegar to the water in which fish is to be boiled. Place the fish on a plate, or coil it in a wire basket. If placed on a plate, tie fish and plate in a piece of cheese-cloth. This keeps fish white. When the water boils lower fish into it, and let it simmer until the fish separates from the bones. When nearly done put in 1 tbsp. salt. Garnish with parsley and slices of lemon. Serve with egg sauce, drawn butter.

Drawn Butter Sauce Recipe. ⅓ c. butter, 1½ c. water, 3 tbsp. flour, ½ tsp. salt, a few grains of pepper. Mix flour, salt, and pepper with one-half the butter, pour on the water and stir over the fire until sauce boils. Add rest of butter, stirring in gradually.

Egg Sauce — Home Recipe. ¼ c. butter, 1 tbsp. flour, ⅓ tsp. salt, ½ pt. boiling water, 3 hard boiled eggs.

School Recipe. 1 tsp. butter, ½ tbsp. flour, ¼ tsp. salt, 1 gill boiling water, ½ hard boiled egg.

Method. Mix the butter, flour, and salt; add the water, boil up once and remove from the fire. Add the eggs, after chopping fine.

Experiment. Have three small pans, one with cold water, a second with water at boiling-point; a third with water at boiling-point to which has been added

½ tsp. salt, ½ tsp. vinegar, one clove, a half bay leaf, a slice of onion and carrot. In each pan, at the same time, place a piece of fish. Let the one in cold water come to boiling-point; keep at that temperature 8 min. Keep the other two at boiling-point for same time. Note the difference. Taste each piece, and see which is the better method for boiling fish.

Notes

Fish is good food for brain workers simply because it is easily digested.

Test for fresh fish: Eyes, bright and protruding; gills, bright red, flesh firm, leaving no mark where pressed with the fingers; tail, firm and not drooping.

Comparative and nutritive values of fish: water 75%, proteid 18%, fat 3 to 6%, mineral 1%.

Division of fish, according to amount and location of oil: a, dry or white-blooded fish (fat in liver and not distributed); cod, haddock, shell-fish, flounder, trout, perch, swordfish and pickerel; b, oily or red-blooded fish (fat distributed through the body); salmon, shad, mackerel, halibut, and herring, sardines, eels.

Each pupil will prepare one small fish like perch, which for the sake of saving time should be ordered from market scaled, cut open, and partly cleaned. Use small pieces of cheese-cloth, or any cloth kept for such things, to clean the fish inside and out. The fish should be raised from bottom of pan, by means of a saucer or anything that will fit in, and tied in a piece of cheese-cloth, just as a large fish would be. Use the individual saucepans or a part of the double boilers.

If a small dish is used to raise the fish, tie the cloth around the fish and dish together.

Fish suitable for baking whole: — cod, haddock, bluefish, small salmon, bass, shad, whitefish. Time for boiling fish, 30–45 minutes.

Read fish notes in Book I. Pupils may be told to look up the subject of fish and to review their last year's lesson on it and be prepared to answer questions.

ORDER OF LESSON

1. Structure of fish. How do they live?
2. Divisions of fish:
   (a) dry or white-blooded fish.
   (b) oily or no-blooded fish.
3. Class of food; value as food.
4. How test fresh fish?
5. Preparations for cooking.
6. Different ways of serving.
7. Discussion of recipe.
8. Practice work.
9. Dish-washing.

SUET PUDDING

LESSON XI

The composition of fats consists of: carbon 79 parts, hydrogen 11 parts, and oxygen 10 parts. Liquid fats are called oils. Fats and oils contain three different oleaginous substances, stearin, olein and margarine. Stearin gives hardness to fats. It is most abundant in tallow and suet. Olein gives oils their fluidity. It is more abundant in oils than

in fats, and in soft fats than in the harder fat of sheep and beef. Margarine has the consistency of lard or butter. It exists in human fat, in butter, and in olive oil. Fats are made of fatty acids and glycerin, the sweet principle, and may be split into these constituents by means of superheated steam or mineral acids, and, in the body, by means of certain fat-splitting ferments, as the steapsin of the pancreatic juice. The fatty acids cause the peculiar odor noticed when fats are cooked at too high a temperature.

The sources of fat are meat, oil of milk, butter, olives, nuts, fruits, vegetables (wheat, cotton seed, etc.), and fish. Fat is found in small quantities in many animal tissues, and in large quantities in adipose tissue and in milk.

Digestion. Fats are not changed chemically until they reach the intestines, when they are emulsified and saponified by the action of the bile and pancreatic juice.

Suet. The best suet, i. e. the firmest, is from the kidneys of the cow. In porterhouse steaks, it is below the tenderloin. Suet is harder than ordinary animal fat, as it contains more stearin.

To prepare Suet. Remove all tissue and chop the suet fine. Mix with a little flour and chop in a cool place, to prevent its becoming soft and sticky.

Suet Pudding — Home Recipe. 2½ c. flour, 1 tsp. soda, ½ tsp. salt, ½ s.s. cinnamon, ½ s.s. nutmeg, 1 c. chopped suet, or ⅔ c. butter, 1 c. chopped raisins or currants, 1 c. milk (or water), 1 c. molasses.

School Recipe. 2 l. tbsp. flour, 1 l. tbsp. chopped suet, ½ tsp. soda, spk. salt, 1 ss. mixed spices, 6

raisins, stoned and chopped, 1 tsp. currants, 1 tbsp. molasses, 1 tbsp. milk.

Method. Mix and sift dry ingredients. Add suet and mix. Mix milk and molasses and add them to dry ingredients. Steam in buttered pudding-mould 3 hours. If water and butter are used, 3 c. of flour will be required, as these thicken less than milk and suet.

Foamy Sauce — Home Recipe. ½ c. butter, 1 c. powdered sugar, 1 tsp. vanilla, ¼ c. boiling water, white of one egg beaten to foam, 2 tbsp. fruit juice or syrup (may be left out).

Cream the butter, add sugar, vanilla and fruit juice; just before serving add the boiling water, stir well, add egg, and beat until foamy.

School Recipe. 1 l. tbsp. butter, 2 l. tbsp. powdered sugar, 2 drops vanilla, 1 tsp. boiling water, 1 tbsp. white of egg.

To vary Suet-pudding Recipe, sugar may be used in place of molasses, and soda omitted. This makes a white suet pudding. Bread crumbs may take the place of most of the flour. Suet is shortening and makes the pudding tender and rich. Other fats may be used instead. If fresh fruits are used, some fat less rich than suet may be substituted for it. Instead of both raisins and currants, only one may be used, and citron added. Figs may be used instead of raisins and currants. Ginger may be substituted for the spices mentioned.

Notes

It will take at least 45 m., probably, for the pudding to steam. Therefore, as in the steamed brown-bread lesson, the most peaceful time for the discussion

is after the articles are fixed in the steamers. If enough time is left for the dish-washing and necessary cleaning up, all the discussion may be held before that work. The teacher knows about how long that part of the lesson will take.

The suet pudding is not so soft and porous as white bread and not so easily mixed with the digestive juices. Moreover, it is a rich food because of the amount of suet it contains. In a food of this kind the different food principles are so mixed that it is hard for each digestive ferment to separate those upon which it acts. For all these reasons, such pudding is not easily digested.

Directions for steaming are the same as in the steamed brown-bread lesson in Book I.

For further discussion of fats and steaming see Book I.

ORDER OF LESSON

1. How make batters?
2. Processes of steaming. Its advantage over baking.
3. Value of pudding as food, and its digestibility.
4. Discussion of recipes.
5. Practice work.
6. Dish-washing.

LAMB STEW

LESSON XII

Tough meats are more nourishing than tender for the reason that tough meats come from the parts of the animal where the exercise of muscles is greatest and where the blood has carried the most nourishment.

For tough meat the cooking is a low, slow process and designed to soften the tough muscular and connective tissues. Both liquid and solid foods are served in a stew. The meat is put on in cold water to extract part of the juice. The vegetables of a stew are not added until the meat is fairly well cooked, for it takes them less time to cook.

Stew is a nourishing food, for proteid and fat are contained in the meat, starch in the dumplings, and acids and water in the vegetables. It is also an inexpensive food. It makes a good luncheon or dinner dish.

Lamb Stew — Home Recipe. Breast of lamb, 1½ pounds, boiling water, about 1 pint; potatoes, 4, medium-sized, quartered and parboiled;[1] onion, 1, about 1½ inches in diameter, sliced; rice, 2 tablespoonfuls; tomato, strained, 1 cupful, or tomato ketchup, 1 tablespoonful; salt and pepper. Brown the onions in a little of the fat in a saucepan; put with them the meat cut roughly into cube-shaped pieces about one and one-half inches thick, and sprinkled with salt and pepper. Cover them with boiling water, heat this to the boiling-point again, then let it simmer directly over the heat for two hours; or cook it over hot water for three hours, or until the meat is tender. After one hour of simmering add the rice; half an hour before dishing the stew add the potatoes; when they are done remove the bones and pieces of fat, stir in the tomato or ketchup, add salt and pepper, if needed, and serve.

School Recipe. Small piece of lamb in two-inch cubes, water to cover, 1 small potato or ½ large

[1] Boiled by themselves for five minutes.

potato, onion, ½ small slice, rice, 1 l. tsp. tomato strained, 2 tbsp., s.s. salt, spk. pepper.

Method. Same as for large recipe.

Dumplings — Home Recipe. Use biscuit recipe, or, if you prefer it, have a regular dumpling recipe. 2 c. flour, 2 tsp. baking powder, 1 tsp. salt, 1 c. milk (or water), or enough to make dough soft enough to handle easily.

School Recipe. ¼ c. flour, ⅓ l. tsp. baking powder, ½ l. s.s. salt, ¼ l. tsp. fat, ⅛ c. milk.

Some housekeepers use the biscuit recipe for dumplings. You may use butter, or part butter and part lard. Drop from the spoon into boiling water. Cover tightly, and keep the water gently boiling for about 10 m. (20 m. for the large recipe.) The dumplings rest on the meat and vegetables of the stew while cooking.

Notes

Point out the different cuts in lamb in fore and in hind quarter, and name them. Tell which parts are tender and which parts tough.

The butcher will cut meat in small chunks about two-inch cubes, about the right size for each girl, who cuts her piece still smaller and cuts the potato small too.

In giving large proportions, do not mention the part of lamb to be used. The pupils should know the different cuts to use for stews — ends of ribs, neck, knuckle, and other tough meats. In the small recipe, add pieces of potato as soon as the meat has been in a few minutes, and the rice a few minutes later.

Cut the potato three or four times, unless it is necessary to hasten it by cutting it smaller. Keep the water bubbling gently. Stir in tomato when almost done. If too thin, i. e. too much liquid in proportion, remove solids when done and boil down the liquid before serving,

ORDER OF LESSON

1. Classification.
2. Division of animal from chart. Point out tender and tough parts.
3. Care of meat and preparation for cooking.
4. Comparison of rules for cooking tender and tough meats.
5. Value of the dish as food.
6. Discussion of recipe.
7. Dumplings. What do they resemble?
8. Practice.
9. Dish-washing.

FRUIT CAKE

LESSON XIII

The foundation of fruit cake is merely a plain cake. To this is added fruit and the mixture called a fruit cake. The spices are put in with the dry ingredients. The fruit is put in with the flour, for if not well mixed with flour the cake will sink. The cake when mixed will be of the consistency of a drop-batter, somewhat stiffer than for plain cake. More heat should be used for baking than is necessary for angel or sponge cake, and less heat than for plain cake, as anything containing molasses burns easily. Plain cake is more digestible than fruit cake, for it is lighter and not so rich.

Fruit Cake — Home Recipe. ½ c. butter, ¾ c.

brown sugar, ¼ c. molasses, ⅓ c. milk, ½ tsp. salt, ½ nutmeg grated, 3 egg yolks, 1 egg, 2¼ c. flour, 2 tbsp. baking powder, ½ tsp. cinnamon, 1 c. raisins, stoned and cut fine. Cream butter, add sugar, gradually, and cream together; add molasses, milk, eggs and fruit. Sift together the dry ingredients, and add to the mixture. Bake in moderate oven one hour.

School Recipe. ½ tsp. molasses, 2 tbsp. raisins, a few slices citron, 2 s.s. cinnamon, 1 s.s. cloves, 1 s.s. allspice, 1 tsp. flour.

Method. Cream butter, add sugar gradually. Add beaten egg and beat vigorously. Add dry ingredients (sifted together) alternately with the liquid (milk and molasses). Add fruit mixed with a little of the flour. To stone raisins, cover with boiling water and when soft squeeze out seeds.

Frosting — Home Recipe. Make frosting from the whites in the proportion: —

White one egg, beaten stiff, ½ c. sifted powdered sugar, about ½ tsp. vanilla.

School Recipe. 5 s.s. cold water, 2 drops vanilla. Confectioners' or powdered sugar till consistency is right.

Tests for Baking. If a piece of paper or flour browns rich brown in 5 m. it is right for butter cakes. If light brown in 5 m. it is right for sponge cakes. Thinner cakes, hotter oven.

Division of time. 20 to 60 m. for cake: first quarter it rises; second quarter, it shows little bubbles, or browns in spots; third quarter, it browns all over; fourth quarter, it separates from the sides and settles.

Tests for Cake. No resistance when pressed gently; or when nothing sticks to straw.

Notes

Read Cake Lesson and Baking-Powder Notes of Book I.

If cake is left standing after it is mixed, some action begins between ingredients of the baking-powder, and the cake will not rise so much.

While the cakes are baking, pupils make frosting, after washing up the dishes they have already used and leaving pans out. They should wash dishes first because the consistency of frosting changes upon standing.

A cake cracks if it rises too fast or if it has too much flour. It is coarse-grained if the oven is too hot, if there is too much baking-powder, or if it is not creamed enough.

ORDER OF LESSON

1. Varieties of cakes — foundation of cakes.
2. Rules for mixing of all batter-cakes.
3. Preparation for making cake.
4. Discussion of recipe.
5. Practice.
6. Baking-tests.
7. Dish-washing.

SUGAR AND CANDY

LESSON XIV

Sugar cane was known in China 2000 years before it was used in Europe.

Classification. Sugar is very popular as a food.

English people use the most, although the consumption of sugar is increasing in all countries. Sugar was first manufactured from sugar cane. It is found in the juice of plants.

Varieties of sugar are cane sugar, grape sugar, fruit sugar, milk sugar. Sugars are carbohydrates and contain carbon, hydrogen and oxygen. Grape sugar is found in grapes and other fruits. Cane sugar is found in juice of sugar cane, beets, carrots and other plants.

Pure cane sugar consists of a mass of white crystals and dissolves easily in about one half of its weight of cold water; and in still less of hot water. It is about 2½ times as sweet as grape sugar.

Milk sugar is found in milk. This sugar is the most digestible sugar for little children, as it does not ferment.

Food Value. Sugar is almost an equivalent of starch that has been digested or made ready for the blood. A potato, like all starchy foods, must be turned into sugar by digestive juices before it can be absorbed by the system.

Digestion of Sugar. Sugar is changed into simple sugars by ferments, but the change is not so great as in the case of starch.

Sugar as a Food. The office of sugar in the blood is to produce heat and energy. It is a good substitute for starchy foods, as it digests more easily and with less force. It has been found by Italian investigators that sugar taken in small quantities as food lessens fatigue and increases working power. Taken in solid form, chocolate is recommended for the same purpose. In the Franco-Prussian War, German

soldiers that were fed on sugar did not become so fatigued and were better nourished than those that had no sugar in their food and drink. It is of great value in cold climates when food containing starch cannot be kept; it is of even greater value in warm countries where very little fat is eaten.

Sugar is fattening and when it is taken in excess it may be changed into fat and stored as reserve material. Sugar offers the best flavors for food — one reason why it is used.

Candy Recipes — Molasses Candy. 1 c. molasses, 3 c. sugar, 1 c. boiling water, 3 tbsp. vinegar, ½ tsp. cream of tartar, ½ c. melted butter and ¼ tsp. soda. Place molasses, sugar, water and vinegar in a kettle; as soon as the mixture boils, add cream of tartar. Boil until it has become brittle. Stir constantly the latter part of time it cooks. When nearly done, add soda and butter. Pour into a buttered pan when nearly hard, and pull. While pulling add 1 tsp. vanilla, ½ tsp. lemon extract.

Ice Cream Candy. 3 c. sugar, ¼ tsp. cream of tartar, ½ c. boiling water, and ½ tbsp. vinegar. Boil all together without stirring, until the mixture is brittle. Try in cold water until it is brittle. Turn on a buttered platter to cool; as edges get cool, turn toward the center, and when cool enough pull until white and glossy. It may be flavored while pulling. Cut into small sticks.

Butter Scotch. 1 c. sugar, ¼ c. molasses. ½ c. butter, 1 tbsp. vinegar, and 2 tbsp. boiling water. Boil all until the mixture is brittle when tried in cold water. Pour into a well buttered dish. When slightly cool mark with a sharp knife into squares.

Chocolate Caramels. 2½ tbsp. butter, 2 c. molasses, 1 c. brown sugar, ½ c. milk, 3 squares chocolate, and 1 tsp. vanilla. Place butter in kettle; when melted, add molasses, sugar, and milk. Stir until sugar is dissolved. When mixture boils add chocolate, stirring until chocolate is melted. Boil until, when tried in cold water, a ball will form in the fingers. Add flavoring just after taking from the fire. Turn into a buttered dish and mark in small squares. Nuts may be added if desired. Take 1 lb. English walnuts, break in pieces and blanch, and chop ½ lb. of almonds.

Peppermints. 1½ c. sugar, ½ c. boiling water and 6 drops oil of peppermint. Place sugar and water in a granite saucepan, and stir until sugar is dissolved. Boil 10 m. Take from fire, add the peppermint and beat until thick, drop from tbsp. on slightly buttered paper.

White Fondant. 2½ lbs. sugar, 1½ c. hot water, ¼ tsp. cream of tartar. Place ingredients in a smooth granite saucepan. Heat gradually to boiling-point. Do not stir. Try, in cold water, when a soft ball will form. After it boils a few minutes, sugar will stick to side of kettle. Remove this with hand dipped in cold water. Pour slowly on a slightly oiled marble slab. Let it stand a few minutes to cool. Scrape fondant with knife to one end of slab, and work with a wooden knife until creamy and white. When it lumps, knead with the hands until perfectly smooth. Place in a bowl covered with oiled paper, so that a crust will not form on top, and let it stand 24 hrs.

To make bonbons, shape fondant into small balls.

For cocoanut, work as much shredded cocoanut as possible into a small piece of fondant.

For nut centers, place nut meats in center of fondant, using just enough to cover.

Candied cherries may be used in the same way.

Cream Mints. Melt fondant over hot water, flavor with a few drops of oil of peppermint, wintergreen, cloves, etc. Drop from spoon on oiled paper.

Notes

The candy recipes may be given just before Christmas.

Choose from variety of recipes given, two kinds of candy. Half of the class may make one kind, half the other. Recipes may be copied by the girls for home use.

ORDER OF LESSON

1. History.
2. Variety.
3. Composition.
4. Food value.
5. Recipes.
6. Wash dishes.
7. Discussion.

CHEESE SOUFFLÉ

LESSON XV

The word soufflé means something light, foamy, or puffed up. Cheese soufflé has somewhat of the consistency of foamy omelet. In cheese soufflé, fondu, or any simple dish containing cheese, caution must be used in regard to the temperature. High tempera-

ture makes cheese leathery and stringy. Cheese soufflé is made light by the use of whites of eggs alone. For that reason it must be baked in a moderate oven so that the air bubbles will not expand so rapidly as to break. They must expand slowly and evenly, expanding the mixture in doing so. The oven door must not be jarred during the baking. One must avoid anything that will break the bubbles of air and cause the mixture to fall. Articles made light by egg alone are very delicate and in both cooking and baking caution should be used.

Cheese soufflé should be used with starchy foods to make up for the deficiency of starch in cheese. Cheese is a concentrated food but hard to digest because it is rich in fat, and compact.

Cheese Soufflé — Home Recipe. 2 tbsp. butter, 1 h. tbsp. flour, ½ c. milk, ½ tsp. salt, spk. pepper, 3 eggs, 1 c. grated cheese.

School Recipe. 2 l. tsp. flour, 2 l. tsp. butter, 2 tbsp. milk, 1 tbsp. grated or chopped cheese, ¼ egg yolk and white separated, ½ s.s. salt, spk. pepper.

Method. Make white sauce from the butter, flour, milk, and seasoning. When partially cooled, add the cheese; and when cheese is melted, add well beaten yolks. Set away to cool. When cold, cut and fold in the whites, beaten to stiff froth. Turn into buttered dish and bake in pan of water about half an hour in moderate oven. Serve at once.

Notes

Go over the process of cheese-making in detail as found in the cheese lesson of Book I. Have pupils name some different kinds of cheese in market. Call

attention to value of germs in cheese and to the making of special kinds of cheese by different germs and different conditions.

Read Cheese Notes in First-Year Course.

Each girl works from an individual recipe. Eggs should be beaten first and then divided, as in the other lessons. The yolk is measured by spoonfuls, and whites by cutting across when they are beaten stiff. Cheese may be grated or chopped by each pupil, who is given a small piece, or by one person all at once, and then measured by pupil. It is well to have each pupil prepare her own piece, and if she cuts it, it might be done on the utensil pan. In that case, the teacher has to judge as to size of piece.

At the previous lesson pupils should be told to review Lesson XII in the First-Year Course, and to report anything else about cheese they are able to find out.

ORDER OF LESSON

1. Varieties of Cheese. Class.
2. Cheese as a food.
3. How is cheese made?
4. Discussion of recipe. What are the different ingredients for?
5. How should cheese be baked?
6. Practice work.
7. Dish-washing.

BREAD-MAKING

LESSONS XVI, XVII, XVIII

For these three lessons, repeat the work given in Book I.

ANGEL CAKE

Lesson XIX

The substance of angel cake is very largely eggs and for that reason it is a very delicate cake. Very little flour is added and its chief purpose is to hold the ingredients together. Cream of tartar and lemon juice, both acid in nature, make the albumen of the egg tender, and the cream of tartar with the soda makes the cake rise; cream of tartar used in too large quantities would be tasted.

The handling of the cake should be delicate, cutting and folding being substituted for vigorous stirring and beating. Use moderate oven. Too much heat makes the air expand too fast, the bubbles burst, and the cake falls.

Angel Cake — Home Recipe. 9 whites, 1¼ c. granulated sugar, ½ tsp. cream of tartar, pinch salt, 1 c. flour, 1 tsp. vanilla.

School Recipe. 1 white of egg, ¼ c. granulated sugar, ⅛ tsp. or ½ s.s. cream of tartar, 3½ tbsp. flour.

Method. Sift flour four or five times. Beat whites half stiff, add cream of tartar and beat again. Add sugar and flavoring. Fold in the flour lightly. Bake in moderate oven about 50 to 60 m. (about 20 m. for individual recipe).

Frosting — Home Recipe. 1 yolk beaten fine, sugar.

School Recipe. ½ yolk beaten fine, sugar to make right consistency.

Scrambled Eggs — Home Recipe. To yolk of 1 egg, beaten, add 2 tsp. milk, s.s. salt, ½ s.s. pepper. Rub butter over the frying-pan and when melted pour in the mixture. Cook until creamy, stirring and scraping from the bottom of the pan.

Notes

Each pupil should make the recipe alone, if pans are large enough for cake of that size. The recipe may be divided if necessary, but that makes an amount too small to handle easily. Housekeepers attend to the baking.

Read Sponge Cake and Omelet Lessons in First-Year Course; the principle is much the same.

To use the yolks, the pupils may make frosting, by adding powdered or confectioners' sugar to a half of the yolk until the frosting just pours from the spoon. This may be spread on bottom and sides of the cake when it comes from the oven, or it may be spread simply on one part. Some of the yolks will then be wasted, for the whole of the yolks will be too much for the small cake. This surplus will be collected and used for some purpose afterwards.

Yolks may be used to make an omelet. The objection to this is that the omelet does not rise much if made from the yolk alone. It will be more like scrambled eggs, and yet it illustrates the same principle as the Angel Cake.

The yolks may be used to make scrambled eggs. Even scrambled eggs are made usually from the white of the eggs too, but this may be explained to the pupils, if this plan is preferred.

ORDER OF LESSON

1. Discussion of recipe: (a) comparison of sponge and angel cake; (b) use of eggs; (c) use of acids.
2. Baking. Temperature of oven. Time.
3. Practice.
4. Dish-washing.

CROQUETTES

LESSON XX

Croquettes. Croquettes may be made from chopped meat, chicken, veal, sweetbreads, fish, soup meat, mushrooms. The mixture usually consists of two parts of chopped meat or cooked, flaked, well-seasoned fish, to one part of white sauce, rather thick. Cheese, macaroni, and some vegetables are also used in croquettes. Croquettes are suitable for luncheons and are a very excellent way of using left-overs.

Frying. For deep-fat frying use a deep frying-pan or a kettle (a wire frying-basket is convenient, but the things to be cooked may be lowered into the fat and taken from it with a spoon-shaped egg-beater). Put the fat into a cold kettle and bring it slowly to the right degree of heat. When the fat begins to smoke, drop an inch cube of white bread into it. If this browns in 40 seconds the fat is right for frying croquettes. This temperature is also right for other articles made of cooked material and for fish and oysters. For doughnuts, fritters and other uncooked articles, 60 seconds is about right.

If the fat is right, dip the basket or the wire spoon into the fat to heat and grease it. If the wire basket

is used, lay four croquettes in it and lower them into the kettle until the fat covers them. When they take on a golden-brown color, lift the basket, shake a little and let food drain a moment before placing on paper. Reheat the fat; test it again if necessary, and fry another form, etc. When all the grease has been absorbed by the paper, arrange the croquettes on a platter and garnish with parsley.

Shaping and Crumbing. Put a heap of fine dried bread-crumbs on a board. Put a tablespoon of water with one egg into a plate and beat it sufficiently to mix the white and yolk. Shape a heaping tablespoon of croquette mixture into balls, roll them into crumbs and, with a knife, lift one by one into the egg, dipping over the croquettes until all is covered. Roll in crumbs again until all the egg is covered, and lay carefully on the board.

Chicken Croquettes. 2 c. cooked chicken, chopped fine; 1 c. thick white sauce; 1 tsp. onion juice; few grains of grated nutmeg; add salt and pepper to taste.

White Sauce. 2 tbsp. butter, ¼ c. flour, ⅛ tsp. white pepper, 1 c. milk or thick cream, 1 tsp. salt.

Method. Add seasonings to chicken, mix with hot white sauce and turn on a platter to cool. When cold, shape into cones, roll in eggs and bread crumbs, and fry in deep fat. Put a small sprig of parsley into each croquette, serve on a folded napkin, or pour a white sauce around them.

Rice Croquettes. 2 c. boiled rice, 1 egg, beaten, 2 tbsp. butter, 2 or 3 tbsp. minced parsley, ½ tsp. salt, ⅛ tsp. pepper; add a few grains of cayenne. If cold rice is used, warm it with 2 or 3 tbsp. milk. Mix all

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AN EVENING CLASS.

The pupils are young women who are at work during the day.

ingredients and shape and fry like chicken croquettes.

Codfish Balls or Cakes. ½ lb. salt codfish, 2 heaping c. of potatoes, 1 egg, ½ tbsp. butter. Boil and mash potatoes. While they are cooking, cover codfish with boiling water. When cool enough, pick the fish into shreds, drain off water, mix fish, potatoes, butter and eggs together, and beat all well. Fry heaping tablespoonful in deep fat, or shape into balls and fry in deep fat.

Notes

Have the fat deep, and do not use butter. Fat used for frying must be hot enough to form a crust on the food cooked in it; otherwise it will soak into the food. As long as it bubbles it is not hot enough to form a crust. Anything that cooks the fat will make the food greasy. The best fat for frying is the one that can be made the hottest without burning. Fat must be deep enough to cover food; then it will be crusted over at once. Fat must be smoking hot before putting food in. Fat must be reheated after each frying. Of all common fats, butter is the worst for frying. Hard fat from beef and veal are good, and drippings still better, but lard is best of all. Olive oil, for it can be heated to 600° F., is superior to any of these. In the south of Europe it is often used for frying, but it is too expensive in our country. Fat usually burns before it boils. The water in the fats makes it bubble when heated. The fat cannot be raised to a temperature above 212° until the water has boiled away.

Use this experiment: heat lard, butter, and drip-

pings in separate saucepan. See which burns first. See which can be made hottest without burning. Which then is best for frying? Which is least desirable?

We use eggs, crumbs, flour, or meal to keep foods from absorbing fat.

To try out fat, cut it into small pieces and place in a pan in the oven with enough cold water to cover it. Let this simmer for several hours. When fat is melted and nearly free from water, strain it, pressing it to obtain all the fat.

To clarify, melt the drippings, tried-out fats, add a few slices of raw potato, and heat slowly in the oven until it stops bubbling. Potato absorbs some of the impurities; the rest will settle to the bottom of the pan. Strain through a cheese-cloth and let stand until solid. Beef fat clarified is a good substitute for butter in bread, biscuits, and gingerbread. It is used also for greasing tins.

Order of Lesson

1. Discuss place of croquettes.
2. Method of frying discussed.
3. Recipe carefully demonstrated by the teacher.
4. Work.
5. Resume discussion and principles of deep-fat frying after serving croquettes.

MUFFINS

LESSON XXI

Review exercise on Muffins in Book I. (This is to be found in the Lesson on Wheat.)

Notes

Have one third of the girls make flour muffins, one third make corn-meal and the remainder the graham muffins.

When muffins are done, have the pupils compare the different kinds in regard to appearance, texture, etc.

Muffins are not an easily digestible food; when eaten hot they form a pasty mass in the mouth, which is hard for the digestive fluids to act upon.

ORDER OF LESSON

1. Discuss batters and doughs.
2. Baking-powder; uses? Effects?
3. Flour? Source? Kinds?
4. Different kinds of muffins.
5. Discuss making of three kinds of muffins, — flour, corn-meal and graham muffins.
6. Practice.
7. Dish-washing.

VEGETABLES

LESSON XXII

The three divisions of vegetables are starchy, leguminous and green vegetables. The first contains a large percentage of starch and, in addition, water,

mineral and a little proteid. The leguminous vegetables contain more proteid than either of the other two classes, combined with starch, water, fat and mineral. The green vegetables contain a large percentage of water (90%), with proteid, a little fat and mineral, and carbohydrates.

Carrots and Turnips. These belong to the plants in which there is a tuber-root bulb stem. Beets, potatoes, onions, parsnips, sweet potatoes, etc. also belong to this group. They contain a large amount of water but, as starchy vegetables, are cooked more than liquid or green vegetables. They take longer to cook than potatoes for they are harder and tougher. The time for cooking depends upon size, age and freshness.

They are an inexpensive and nutritious food. Medium-sized carrots and turnips should be chosen in preference to large and old ones, which are woody and tough, require longer cooking and more fuel, and are less nutritious. Carrots and turnips are good in seasons when fresh green vegetables are not in the market or are expensive. They can be used frequently but should be served in new and attractive ways. They can be mashed, sliced, creamed, creamed together or creamed with peas, etc.

White Sauce — Home Recipe. 2 c. milk, 2 tbsp. butter, 1 tbsp. flour, ½ tsp. salt, ½ s.s. pepper, vegetables 8 small or 5 or 6 large turnips or carrots. If both are used take half the amount.

School Recipe. 1 tsp. flour, 1 tsp. butter, s.s. salt, spk. pepper, ¼ c. milk, 1 small carrot, 1 small turnip (or ½ large).

Wash and scrape carrot and peel turnip. Cut in

cubes. Cook in boiling water till soft, 20–30 m. Drain; serve in the white sauce.

NOTE. — The vegetable lesson in the first year is necessarily a long one. As the time for discussion is so short, it seems advisable to give a second lesson on this subject, so that the subject may be reviewed and any vegetable in season may be discussed and cooked.

Notes

Review Vegetable Lesson in Book I.

Have the pupils name the vegetables in the market and note those that are inexpensive for the different seasons.

ORDER OF LESSON

1. Division of vegetables according to composition; according to parts of plant.
2. Composition of each division.
3. Method of cooking vegetables.
4. Preparation of carrots and turnips.
5. Discussion of recipe.
6. Practice work.
7. Dish-washing.

SAGO AND TAPIOCA CREAM

LESSON XXIII

Source of Tapioca. Tapioca, which is almost pure starch, is manufactured from the root of the manioc tree. The tree is cultivated in tropical America, Africa, etc. It grows in a bushy form, with stems usually 6 to 8 feet high, but sometimes much more.

The stems are white, brittle, and have a very large pith. The branches are crooked. The leaves are near the extremities of the branches, large, deeply 7-parted. The roots are very large, turnip-like, sometimes weighing thirty lbs. They contain an acrid milky juice, so poisonous as to cause death in a few minutes, but this is owing to the presence of hydrocyanic acid, which is quickly dissipated by pressure and heat; the root, grated, dried on hot metal plates and roughly powdered, becomes an article of food, very largely used in South America and there very generally known as farina. The expressed juice furnishes by deposition the delicate and nearly pure starch which is the tapioca of commerce.

Source of Sago. Sago is a nutritive substance obtained from several species of palms, especially the metroxylon, which abounds in Siam and on the west coast of New Guinea. It grows also in Sumatra, Borneo, Timor, Buro, and other islands of the Indian Archipelago. The tree attains a height of 40 to 60 feet, and within the ligneous bark it is filled with fibres and flour.

It first blooms when 10 to 15 years old. The produce of a tree averages 750 lbs. A large quantity of sago flour is annually sent from Borneo, Sumatra, and Siam, to Singapore, the leading market, where it is purified and fitted for use as starch in manufactures. Sago comes from the soft inside parts of the trunk of sago. Starch is drawn out, powdered, mixed with water and rubbed through a sieve with small holes. Pictures of the tree would aid greatly in giving the lesson, and different samples may be

secured from the store so that pupils will be able to recognize them.

Home Recipe. 2 tbsp. tapioca, 1 pt. milk, 2 yolks of eggs, ⅓ c. sugar, ½ s.s. salt, whites of 2 eggs and ½ tsp. vanilla.

Method. Soak tapioca in hot water enough to cover it, in top part of double boiler, placed on back of stove. When the water is absorbed, add milk, and cook until tapioca is soft and transparent. Beat yolks of eggs. Add sugar and salt. Pour the boiling mixture on the eggs and cook 2 or 3 m., or until it thickens like boiled custard. Remove from the fire, add whites of the eggs, beaten to a foam. Stir well and when cool, flavor. Do not try to mould it, as it is more delicate when soft. In this the tapioca is soaked in the milk of the custard, and the whites of the eggs are mixed with the custard, instead of added as for a meringue as directed in the method proposed for the individual recipes. Thus it has a different consistency and is more foamy.

School Recipe. 1 tsp. tapioca, boiled custard, ¼ c. milk, ¼ yolk, 2 l. tsp. sugar, s.s. salt, and ½ s.s. vanilla. For meringue: 1 h. tsp. stiff white of egg, to 2 s.s. powdered sugar. Brown in oven, if there is time.

Method. Cook tapioca in enough boiling water to cover. Stir until clear and dissolved. Add more boiling water, if necessary. Place in the moulds. Make a custard thus: scald milk, beat yolks slightly and add sugar and salt. Pour hot milk on the mixture. Stir and return to double boiler to cook until slightly thick. Add flavoring. Pour custard over tapioca in mould and add meringue. Brown in oven.

Notes

Notice that yolks of eggs are used. Whole eggs may be used but they do not make so smooth a custard. When eggs are high, two yolks may be used instead of three, half a tablespoon of cornstarch mixed with a tablespoon of cold milk being stirred into the rest of the milk and scalded with it.

This lesson will give a review of the use of eggs as a thickening agent and the making of plain boiled custard or "floating island," and also a review of the cooking of starchy foods. See Lesson in First-year Course on Custard. The work may be apportioned as in the earlier lesson, each pupil making the small recipe. The only change is in the addition of the sago or tapioca. Most kinds of sago or tapioca now in the market need to be soaked all night or several hours.

Tapioca is a nourishing food, and supplies all the food elements. It is also digestible and economical.

High temperature upon the custard would curdle it or make the egg harden in pieces. For that reason the custard should be cooked in a double boiler and not directly over the flame. The milk should not become too hot and the custard should be stirred to prevent curdling. If the custard does curdle, put the dish in cold water and beat the mixture thoroughly. A Dover egg-beater may be used to beat the custard. If the custard cooks a moment too long, it will curdle. It is safer to take it from the fire before you think it is quite done, as the heat of the boiler cooks it a little while it is being turned out.

ORDER OF LESSON

1. Cooking of starchy foods.
2. Test for starchy foods.
3. Value of tapioca and custard as foods.
4. Discussion of recipe.
5. What fats must be considered in cooking the custard?
6. Practice work.
7. Dish-washing.

SANDWICHES

LESSON XXIV

It is most important that pupils and teachers should learn how to make good sandwiches.

Have the bread a day old, if possible. Remove the crusts and cut slices as thinly as possible. The butter may be creamed and the bread spread before cutting from the loaf. The filling should be spread upon half the slices and covered with the remaining pieces. If fancy shapes are desired, cut the bread before buttering. Wrap each sandwich in paraffine paper and keep in a cool place.

Sandwiches may be made of whole wheat, graham, rye, or white bread. Have pupils make sandwiches at home during the week of this lesson and bring one to class at next lesson.

Assign different kinds of bread to a group of pupils and at next lesson compare sandwiches made of different kinds of bread, and discuss their nutritive value. Discuss different kinds of fillings and seasons for each.

As the practice work is short, two or three kinds of sandwiches may be made. If this is done, divide the class into groups — three — and have as many

kinds of sandwiches made. This allows for comparisons and discussion at the end of the lesson.

As the practice work is short, a number of recipes may be given.

Recipes

Lettuce Sandwiches. Cut end slice from the bread. Spread each slice with creamed butter before cutting from the loaf. Remove the crusts, put slices together in pairs, and cut in squares, oblongs, or triangles. Graham, brown, white or entire wheat bread may be used. Put crisp lettuce leaves, after washing and thoroughly drying, between these slices; a teaspoon of mayonnaise dressing on each leaf may be added.

Egg Sandwiches. Spread bread same as in lettuce sandwiches. Boil eggs in cold water until hard cooked. Chop the white very fine; press the yolks through a strainer. Mix yolks and whites and season with salt and pepper; mix with cream salad dressing, and spread between slices of bread.

Sardine Sandwiches. Remove skin and bones from sardines and mash to a paste. Add same amount of yolk of hard-cooked eggs, rubbed through a sieve. Season with salt, red pepper, and a few drops of lemon juice; mix with melted butter or olive oil. Spread this between thin slices of buttered bread.

Ham Sandwiches. These are made by putting sliced cold boiled ham between thin slices of buttered bread. Cut ham as thinly as possible.

Nut and Cheese Sandwiches. Chop English walnut meat; mix with grated cheese. Season with salt and cayenne pepper and place the mixture between thin slices of buttered bread.

Fruit or Jelly Sandwiches. These may be made from crackers or Zephyrettes by spreading jelly mixed with English walnuts chopped fine.

Creamed Salad Dressing for Egg Sandwiches. ½ tbsp. salt, ½ tbsp. mustard, ¾ tbsp. sugar, 1 egg slightly beaten, 2½ tbsp. melted butter, ¾ cup cream, ¼ cup butter. Mix all together in this order. Add vinegar slowly, cook mustard over boiling water, keep stirring until it thickens, strain and cool.

Shad-roe Sandwiches. These may be made at home for a simple luncheon.

Simmer a pair of shad-roe in salted water for 20 minutes, with a small slice of onion and one tsp. vinegar; when cold, break in pieces and crush with a silver fork. Moisten well with mayonnaise dressing. Chop a small bunch of fresh water-cress from which the heavier stems have been removed; if this is hard to get, shred fine the inner part of a small head of lettuce. Spread one slice of white bread lightly with mayonnaise and cover with the chopped cress or lettuce; spread the second slice with butter, and then with shad-roe mixture, and press lightly together.

Mint Cucumber Sandwiches. For light summer refreshments dainty and delicious sandwiches may be made by dipping thin slices of fresh young cucumbers in well seasoned French dressing and placing with a sprinkling of finely chopped fresh mint between thin slices of white bread. Spread with unsalted butter. These sandwiches should be put together as short a time as possible before serving, and, except the butter, everything should be very cold.

ORDER OF LESSON

1. Discuss kinds of bread for making good sandwiches.
2. Nutritive value of breads reviewed in this lesson.
3. Discuss kinds of fillings for sandwiches.
4. Make sandwiches.
5. Serve.
6. Review discussion.

CREAM PUFFS

LESSON XXV

Cream Puffs — Home Recipe. Cakes: 1 c. hot water, ½ tsp. salt, ½ c. butter, 1½ c. pastry flour, 5 eggs. Cream filling: 1 pt. milk, boiled, 2 tbsp. cornstarch, 3 eggs, well beaten, ¾ c. sugar, 1 s.s. salt, (or 1 tsp. butter).

School Recipe. Cakes: ¼ c. hot water, 2 tbsp. butter, ⅓ c. flour, 1 egg. Cream filling: ½ c. hot milk, 2 tbsp. flour, ½ egg, 3 tbsp. sugar, ½ tsp. butter, 5 drops vanilla.

Method. For the cakes, heat water and butter until water boils. Add flour all at once and mix thoroughly. Cook 3 m. and when cool add the egg unbeaten. Drop by spoonful on buttered pan (some distance apart). Bake 25 or 30 m. or till brown and well puffed in hot oven. When cold, open at the side and fill with cream filling. For the filling, moisten flour with a little cold milk, and add this to the hot milk. Cook in double boiler 15 m. Beat the egg and sugar together. Pour the thickened milk over the egg, add the butter, and cook till the egg thickens. Flavor when cool.

Éclairs. Bake cream mixture in pieces about 4 inches long, and 1½ inches wide. When cool, split and fill with cream. Ice with chocolate or vanilla frosting.

Note

Make in groups of two, one making crust and the other cream filling, unless it can be afforded that each make both. If the latter method is used, make crust first and, while baking, make filling. If in groups of two, both can be cooking about the same time; or let one have charge of the making of the crust and the other help her and notice all that she does; let the other have charge of the filling in the same way, so that the same one will not take the responsibility in both cases.

Order of Lesson

1. Discussion of recipe.
   (a) Method of making.
   (b) Method of baking and filling.
2. Practice work.
3. Dish-washing.

COCOA AND CHOCOLATE

Lesson XXVI

Botanical Origin. The scientific name of cocoa is Theobroma Cacao. Theobroma means "food for the gods," and comes from the Greek. Only one species is cultivated.

History. It has been known in Central America from time immemorial. The Spaniards found it in

use there. Columbus brought home samples. For a long time it was imported into Spain in the prepared state. The seeds were used as money. Finally the Spaniards imported the bean and did their own manufacturing. For some time they guarded the secret and had a monopoly. From Spain and Portugal the use of cocoa spread into Europe. At present it is grown in South America (Brazil), Central America, British West Indies and Ceylon, and some parts of Asia and Africa.

Growth. The tree grows to a height of 12 to 30 feet. It is a spreading tree which bears leaves, fruit, and flowers during the whole year. The gathering season is June and December. The tree bears in three years, but reaches its height of productiveness in the eighth year. Conditions most favorable to its growth are temperature of 80° F., a moist soil, and a humid atmosphere. The fruit consists of a pod, intermediate in shape between a melon and a cucumber, irregular and angular, from 6 inches to a foot in length and about 3 inches in diameter. The pod consists of a rind — which is about ½ inch thick, smooth, fleshy, and tough, yellow with a red tinge on the side — and a pap-like pulp or spongy substance, which is mucilaginous and of a sweet, slightly acid taste. This pulp separates from the rind when the fruit is ripe. Imbedded in the pulp are five rows of seeds separated by partitions. One pod contains from twenty to forty seeds. Each seed consists of a brittle husk and the crisp dark inside called the cocoa nibs. The beans or seeds are about the size of an ordinary almond, whitish when fresh but brown when dry. In taste they are disagreeable

and bitter. The whole pod is green when fresh (though yellow and red in the sun) and later becomes a dark yellow or yellowish brown. The leaves, located chiefly at the top of the tree, are 7 to 10 inches in length and 2½ to 3½ inches in breadth.

Preparation for Market. The ripe fruit is gathered with long poles with two prongs or a knife at the end. As a first step in the preparation for market, the seeds or beans undergo fermentation to soften the mucilaginous pulp so that the seeds may be easily removed from it. They are sometimes heaped upon the ground, or they may be buried in the ground for twenty-four hours, or for a few days. The fruit is then opened and the seeds after removal are cured, or put through a process of sweating, after which they are dried in the sun or before a fire. They are then ready to be made either into cocoa or into chocolate. The process differs somewhat in the two cases.

Cocoa. The beans are freed by machines from dust and foreign matter and are then roasted in large revolving cylinders before a charcoal fire to develop the aroma and produce cocoa of full flavor and character. As result of the process of roasting, the flavor is developed. There is a change in color and taste, about 10% of the weight is lost, and the shell is loosened. After the roasting the beans are crushed by machinery into small fragments called nibs, and the husks are loosened by the same process of crushing. The nibs and the broken husks are thoroughly separated by winnowing. The bad fragments are removed by hand. The cocoa nibs or broken beans are then ground and a part of the cocoa-butter is

removed by pressure, after which the beans are pulverized so fine that the powder can pass through a sieve that has several thousand meshes to the square inch.

Chocolate. The beans undergo the same processes for chocolate as for cocoa until after the winnowing. For chocolate they are then ground to a perfectly homogeneous mass or paste, and for plain chocolate the mass is then delicately flavored and put into moulds for shaping. For sweetened chocolate a definite amount of the purest sugar, previously pulverized, is added, and the whole thoroughly mixed. Pure vanilla is added, and sometimes cloves and cinnamon, and the paste is put into moulds to be cooled into shape and wrapped for shipment.

Chemical Composition. Unroasted: moisture, 7.11%, cocoa butter, 51.78, theobromine, .35, starch, 5.78, cellulose, 3.1, other carbohydrates, 2.62, gluco cider, etc., 10.05, protein, 15.61, ash or mineral, 3.60.

Roasted: moisture, 6.51%; cocoa butter, 49.24; theobromine, .43; starch, 10.43; cellulose, 3.1; other carbohydrates, 2.6; gluco cider, 7.78; protein, 18.33 (mostly soluble), ash or mineral, 3.92.

Explanation of Composition. Cocoa butter is a solid white inodorous fat used medicinally. It does not become rancid readily, is soluble in boiling alcohol, from which it crystallizes on cooling, melts at 86 degrees F. (30 degrees C.) as butter fat. Saponification yields oleic acid, etc.

Theobromine is the active principle, or alkaloid, like caffeine in coffee, and was discovered in 1841. It occurs in nearly equal quantities in the husk and in the kernel. When pure it crystallizes in rhombic

prisms. It is almost insoluble in benzol and petroleum spirits; is slightly soluble in cold water, alcohol, and chloroform; and is readily soluble in hot water and hot alcohol. With acids it forms crystalline compounds, among them nitrate and hydrochlorate.

The gum resembles dextrine and is obtained from a cold water infusion of cocoa nibs in very small amount.

Cocoa-red gives cocoa its characteristic color and is not found in the freshly gathered beans. It arises from the oxidation of the astringent principle, or natural tannin. It is partly soluble in alcohol and resembles resin. The astringent principle, or natural tannin, differs much from the tannin of tea or coffee. The volatile principle is produced during fermentation, modified by subsequent roasting, and dissolved by cold water.

Adulterants and Substitutes. For adulteration of cocoa, animal fats, cocoanut oil, lard, flour and starch, chicory, chalk, Venetian red and iron-bearing earths are used. In the United States earthnuts, groundnuts, peanuts, and a kind of oily underground pea, roasted, are used for cocoa. In Spain, earthnuts, chestnuts or cypress, esculin, containing no theobromine, and cocoa leaves containing cocoaine like theine, are used.

Cocoa Preparations. Soluble cocoa is a mixture of ground cocoa with starch or sugar. By boiling, a thick mucilage is produced in which cocoa is suspended, not dissolved, so that the term soluble is incorrect.

Chocolate is cocoa ground up with sugar, and

flavored with vanilla, sometimes with bitter almonds, cinnamon and other spices. It generally contains starch or flour.

Flake or rock cocoa is prepared from the whole seed nibs and husk, ground together into a paste. There are three grades, of which the second and third contain an excessive proportion of husk.

Pressed cocoa, like Van Houten's, is prepared from the cocoa nibs and contains 33% cocoa butter. Granulated cocoa is prepared by reduction to coarse powder. The particles are covered with layers of starch or sugar.

Food Value. Cocoa is used in cooking for beverage and confections. It is less stimulating and exciting than tea and coffee, but more nutritious than either of the others, especially in the form of chocolate, i.e. with the cocoa butter. However, chocolate is a heavier beverage than cocoa. In the digestion of cocoa and chocolate there is a residue of unabsorbed matter from the protein.

Unlike tea, or even coffee, cocoa must be boiled to be agreeable. The infusion of cocoa made by steeping without boiling is bitter and unnutritious. Chocolate is more digestible if the oily scum which forms on the surface after boiling is removed,

Chocolate — Home Recipe. Put four ounces of Baker's Chocolate, two tbsp. sugar, 2 tbsp. hot water (and a pinch of salt) in a small saucepan, and boil until smooth. Stir constantly. Add gradually 1 pt. of boiling water, and when ready for serving, add 1 pt. of hot milk. Use all milk and two squares of chocolate, if it is liked richer. It may be thickened with 1 tbsp. cornstarch wet in a little cold water, and the

mixture boiled five minutes before adding the hot milk.

School Recipe. 1 oz. Baker's chocolate, 1 tsp. sugar, 1 tsp. hot water, ½ c. water, ½ c. milk, or all milk, ½ c.

Breakfast Cocoa — Home Recipe. For six cupfuls of cocoa use two tbsp. of the powder, 2 tbsp. sugar, half a pint of boiling water, and a pint and a half of milk. Put the milk on the stove in the double boiler. Put the cocoa and sugar in a saucepan and gradually pour the hot water upon them, stirring all the time. Place the saucepan on the fire and stir until the contents boil. Let boil 5 m. Then add the boiling milk and serve.

School Recipe. 1 tsp. powdered cocoa, 1 tsp. sugar, ½ c. water, ½ c. milk, or 1 c. milk and no water.

Notes

From wholesale grocers may be obtained examples of all stages in the manufacture except the tree and fruit. This lack may be supplied with pictures. By the aid of these the natural history and preparation for market may be developed. Probably all the laboratories contain the educational exhibit of Walter Baker & Co., so that the samples and pictures in that exhibit will be of great value in giving the lesson.

Chocolate contains more nourishment than cocoa because it contains the fat or cocoa butter, which is usually removed in the preparation of cocoa. Chocolate is a food and can to a certain extent take the place of other food, while tea and coffee cannot, as they have but small food value.

Half the amounts may be used for the individual recipes, if desired; or, for the sake of economy, the cocoa and chocolate may be made in groups.

ORDER OF LESSON

1. Natural history.
2. History.
3. Preparation for market.
4. Chemical composition (roasted).
5. Value as food.
6. Preparation for the table.

PIE

LESSON XXVII

Pastry is a stiff dough, prepared from six measures of flour to one measure of liquid. Puff paste is richer than pastry.

Apple, lemon, custard and dried fruit pies may be had in any season. In spring rhubarb pie is best; in summer cherry and berry pies are best. The Thanksgiving pie is the pumpkin pie, and for Christmas the mince and cranberry are favored.

Division of Pies. Pies made with two crusts are the fruit and mince pies. Pumpkin, squash, custard, and lemon pies are made with an undercrust. Pies made with upper crust are the cobbler, English apple pie, and nappy meat pies. Rhubarb and cranberry pies are made with bars of crust, and lemon, cocoanut and pineapple pies with meringue.

Digestibility. Pastry is not a form of food to be recommended, and should never be eaten by young children, or by people of delicate digestion. The

large amount of fat mixed with the flour, which coats the starch grains, makes it difficult for the digestive juices to penetrate to the starch, and as the fat is digested neither in the mouth nor in the stomach, the starch is not acted upon until late in the process of digestion. If pastry is to be eaten, however, it should be light, flaky, and thoroughly cooked. Puff paste is hard to make and expensive, and its preparation has no place in a public-school course.

Since pastry flour contains more starch and less gluten than bread flour, it makes a more tender paste. For fat, either butter, beef drippings, lard or sometimes cottolene may be used. Lard makes a whiter paste than butter, but pastry made with butter or beef drippings is considered more digestible. In summer, ice water is desirable. It is essential to good pastry, that the fat should not melt until after the baking begins. Salt to flavor pie-crust, and sometimes baking-powder to make it light, are used.

Manipulation in making Pastry. This consists in cutting the butter into the flour with a knife, or in rubbing it in with the tips of the fingers, stirring in the liquid with a knife, patting and lightly rolling the dough and cutting it into shape for baking. Cutting butter into the flour is by far the better process.

Requisites. Handle as little as possible; have everything cold. It is a good plan to put pastry into the ice-box before baking; it may be kept several days if it is placed where the air cannot harden the outer surface. It improves the pastry to wash the butter and work it under water until waxy, to remove the salt and buttermilk. A hot oven is required, but the heat should be lessened after a short time. The pastry

should rise in the oven and then brown. The time of baking is from 40 to 50 m. It is done when it slips from the pan.

To prevent the undercrust from absorbing juices, mix a little flour and sugar, sprinkle through the pie; bake crust partly or wholly before adding the filling; brush over pastry with white of egg; bake thoroughly. Do not have pastry too rich.

To prevent the juices from running out, put a stick of macaroni in the pie to absorb them; mix some sugar and flour and sprinkle through the pie; wet each crust with cold water and press; make a syrup of sugar and put into the pie through holes in the top after the pie is baked; or put on the crust loosely, as it shrinks in baking.

Pastry — Home Recipe. 1 c. pastry flour, ¼ c. butter, or 2 tbsp. butter, 2 tbsp. drippings, ½ tsp. salt, ice water less than ¼ c.

School Recipe. ¼ c. flour, 1 tbsp. butter, 1 s.s. salt, about 1 tbsp. ice water. Fat may be used in either recipe, if very plain paste is desired. (16 tbsp. liquid equals 1 c. ¼ c. equals 4 tbsp.)

Method. Mix and sift dry ingredients; cut in the shortening. Add ice water slowly at the side, stirring with a knife. When a stiff dough is formed, turn on a floured board, pat with a rolling-pin, and roll lightly into an oblong piece.

Half of the butter could be used at first, and the rest spread upon the paste at this stage of the process. If that is done, fold it and make three layers; pat and roll out again to get as much air as is possible. Roll out to about ¼ inch thick and fit to the pie plate.

Apple Pie — Home Recipe. Select sour apples,

pare, core, cut into slices, and with these nearly fill the pie-plate, which has been lined with paste. Sprinkle with sugar, allowing 1 tbsp. to 1 apple. Flavor with cinnamon. Lemon juice, or nutmeg may be substituted for cinnamon, and if a richer pie is desired, bits of butter may be dotted over the surface. Cover with a crust and press together the edges of the two crusts, moistened with a little water. Perforate the upper crust with a large fork, or in some way, so that steam may escape. Bake about ¾ hour.

Lemon Filling — Home Recipe. 1 c. boiling water, 3 eggs, 1 tbsp. butter, 1 l. tbsp. cornstarch, 1 c. sugar, 2 lemons (rind and juices).

School Recipe. ¼ c. boiling water, ¼ egg, separated, 1 s.s. butter, 1 l. tsp. cornstarch, 2 l. tbsp. sugar, juice of ¼ lemon.

Method. Mix cornstarch and sugar, add to water, boil 5 m. Add lemon and, when cool,— yolks and butter. Bake 20 m. Pile meringue on top.

ORDER OF LESSON

1. Requisites for good pies: —
   a. What was the condition and material for biscuits?
   b. What kind of oven for biscuits or pies?
   c. What caution necessary in making biscuits and pies?
2. Discussion of recipe.
3. Practice.
4. Dish-washing.

CELERY SOUP

LESSON XXVIII

Division. Soups are divided into two general classes. Those without a stock are cream soups, a very thin purée and the pulp of a cooked vegetable,

strained and thinned with milk or cream. Those with stocks are made from meat,— consommé, bouillon, broths, extracts, beef tea.

Serving. Served with soups are bread crusts — cut-off pieces one to two inches in size; bread sticks; croutons; cut buttered slices of bread; dippets, narrow strips of bread toasted; finger rolls; milk biscuit; baking-powder biscuit; crackers plain, toasted or cheesed; water crackers.

To serve in soups there may be vegetables cut in fancy shapes, macaroni in rings, hard-boiled eggs (poached in consommé), cheese balls, cubes of custard, slices of lemon, bread crumbs (soaked in egg), barley.

Nutritive Value. Soups are not very nutritious, but are rather stimulating, easily digested and appetizing. Cream soups contain milk, which is nourishing, vegetables, pulp, etc. Hearty soups should not be served at a course dinner; a light simple soup is better.

Celery Soup — Home Recipe. Celery, 3 roots or 3 outside pieces, 3 stalks with leaves, 1 pt. hot water (or enough to cover celery), 1 qt. milk, 2 tbsp. butter, 2 tbsp. flour, 1½ tsp. salt, ⅛ tsp. celery salt, ⅛ tsp. pepper, onion.

School recipe. ¼ c. celery, ½ c. boiling water, ½ tsp. butter, ½ tbsp. flour (or 1 tsp. yolk), ½ c. milk, or ¼ c. milk and ¼ c. cream, ⅛ tsp. lemon juice, salt, pepper.

Method. Wash, scrape celery, and cut into ½ inch pieces. Cook in the water till very soft. Renew water as it boils away. Cook onions, if used, and milk in double boiler, and add to it the celery. Rub

the mixture through the strainer and heat again in double boiler. Make white sauce of the butter and flour and the liquid milk and celery stock. Pupils may write method and recipes in their own words, if time allows, from experience.

Green Pea Soup — Recipe. 1 pt. or 1 can green peas, 1 qt. boiling water, 1 pt. milk, 2 tbsp. butter, 2 tbsp. flour, 1 tsp. salt, $\frac{1}{8}$ tsp. pepper, $\frac{1}{2}$ 1 tsp. sugar (less for young peas).

Method. Scald milk. Cook peas until soft and mash through a strainer; add milk and reheat. Rub the flour and butter together and stir a little of the soup into them. Place this mixture into the rest of the soup. Stir until smooth, add seasoning and sugar and serve with croutons.

Croutons. Use buttered slices of bread, one half-inch thick and cut into half-inch squares. Brown these on a pan in the oven, stirring often, until they are crisp and brown. Serve with any soup.

Note

Read Lesson on Bean Soup, First-year Course.

ORDER OF LESSON

1. Division of soups.
2. What to serve with soups.
3. Discussion of recipe.
4. Practice.
5. Dish-washing.

SOUP STOCK

Lesson XXIX

Soup stock is the basis of all meat soup. It is made of the parts of meat that are soluble, of vegetables, and sometimes of other ingredients.

Bone is the hardest of all animal tissue and is about one half water; the rest consists of about $\frac{2}{3}$ mineral and $\frac{1}{3}$ animal matter. The mineral is largely calcium phosphate, called phosphate of lime, and the animal matter chiefly fat and collagen, which is often called ossein in bones. In the center of hollow bones is a fatty material called marrow; around this is the slippery substance called cartilage or gristle. Cartilage may be called soft bone. The older the animal, the harder the bones become. By long cooking the bones, collagen and cartilage are changed to gelatine, and this is soluble in hot water.

Material. Place any raw meat, parts cut from meat by the butcher, and the flank ends of steak, in one jar, and parts of cooked meat and bone, except mutton fat, in another jar. The water that meat has been cooked in, also vegetable water, except that of strongly flavored vegetables like onions, turnips, cabbages, or potatoes, can be added to the stock.

Soup Meat. Soup meat ought to include some fat, as the cake it forms when cold helps to preserve the stock. Have all the butcher's trimmings sent to the house if you make soup stock. For white stock use

veal and chicken. For brown stock use beef, part of it browned, and brown all the vegetables. Caramel is used to darken and flavor stock. Have the bones sawed into 1-inch lengths and split; cut meat into inch cubes or smaller. If only raw meat is used, brown $\frac{1}{3}$ of it in a little fat in a pan, as this will flavor the soup.

Food Value. Strong broth contains about 5% of nutritious material. Soup is usually weaker than this. The soup has a strong meat flavor and the meat is tasteless, because the best part of the meat has passed into the soup. These extractives stimulate the secretion of gastric juice and the warming effect of the soup prepares the stomach for food.

Soup Stock — Home Recipes. 2 lbs. raw meat and bone, 1 lb. cooked meat or meat and bone, 3 qts. cold water, either fresh or from cooked meat or vegetables; for 1 lb. of meat and bone, allow 1 heaping tbsp. of onion, turnip, carrot each. These may be cut into half-inch cubes. 1 stalk or 1 root of celery, 1 piece of parsley, $\frac{1}{2}$ tsp. salt, 2 peppercorns, a few grains of pepper, and one piece of bay leaf.

Method. Have meat and bones soak in water for 1 hour, then simmer in a kettle four or five hours, or until meat is in shreds. One hour before taking stock from the fire, add the vegetables and seasonings. If vegetables are soft, strain the stock through a coarse strainer and set aside for two days or until the fat hardens on the top. Remove all the fat.

Stock made without vegetables keeps best in hot weather. To stock made without vegetables add 1 tbsp. of each vegetable in the recipe to 1 pint of stock, cook them in the stock an hour and strain.

Salt preserves stock, but it must be used sparingly, for stock grows saltier as you keep it.

If the stock is to be used the same day that it is made, remove all the fat that you possibly can and take out the rest with a little ice wrapped in a cloth. When making vegetable soups, cook the vegetables and other materials in a small quantity of stock and add this with them to the portion served. Stock used instead of water in meat sauces, stews, and gravies, makes them richer.

To clear the soup stock, place stock in a saucepan and stir into it the whites and crushed shell of as many eggs as there are quarts of stock. Let it boil about two minutes, keep it hot, not simmering, for 20 m., so that the albumen, as it coagulates, may gather up every particle in the stock. Pour through a fine strainer and then through another strainer that has cheese-cloth over it.

Meat Soups. These may be made from cleared or uncleared stock. Season to taste before serving. Beef stock is better for macaroni and vermicelli soups. Mutton or chicken stock is better for rice and barley soups.

Tomato Soup. Add to 1 pt. of stock a half can of tomatoes stewed and strained, and ½ tsp. sugar.

Noodle Soup. To 1 qt. of stock add ¼ c. of noodles.

Note

Where classes work 1½ hours, it will be necessary for the teacher to prepare the material for soup stock for the first week before the first class of the day comes into the laboratory. The method can be discussed and soup stock finished by the time the

third or last class leaves the room. The next week, the same classes can review the method, the teacher showing soup stock made the previous week, and some soup may be made of this stock. Each girl should be requested to make soup stock at home this week.

ORDER OF LESSON

1. Use of soup stock.
2. Composition of bone.
3. Materials for soup stock discussed.
4. Food value emphasized.
5. Discuss recipe and method.

SALADS

LESSON XXX

Salads are a very important part of the diet, as they are now served with almost every dinner. They may be made in a variety of ways, of meat, fish, vegetable, fruits, and a dressing.

Lettuce, watercress, chicory, cucumbers, contain some nourishment and are cooling and refreshing. They also stimulate the appetite. They are valuable for water and potash salts and are good in summer in place of meats. A salad dressing consists largely of olive oil and this contains a large amount of nourishment, and so is of great value to the system.

Vegetable salads should be served crisp and cold. Vegetables must be thoroughly washed and stand in a cold place until time to serve. Add the dressing at the table or just before serving.

Cold or left-over vegetables may be used in salads, and may be mixed with French dressing and placed

in a cold place about one hour before serving. When several vegetables are used in the same salad mix them separately with salt, pepper, oil and vinegar, and arrange together just before serving. In making meat salads cut off all gristle and skin, and cut into small pieces like cubes; then mix with French dressing, and let the mixture stand a while before mixing with vegetables. Fish salad should be flaked. When the dressing is added at the table, first put on pepper and salt, then oil, and lastly vinegar.

The requisites for good salad are: crisp, cold vegetables and fruits; meats freed from skin and gristle and cut into cubes of equal size; ingredients carefully proportioned, blended and well-mixed; dressing added at the right time; and attractive serving.

French Dressing — Home recipe. ½ tsp. salt, ¼ tsp. pepper, 4 tbsp. olive oil, 2 tbsp. vinegar.

School Recipe. ¼ tsp. salt, ⅛ tsp. pepper, ½ tbsp. vinegar, and 1 tbsp. oil.

Method. Put ingredients together and stir until well mixed. Add to salad ingredients just before serving.

Mayonnaise Dressing. 1 tsp. mustard, 1 tsp. salt, 1 tsp. sugar, spk. cayenne pepper, yolk of two eggs, 2½ tbsp. lemon juice, 2½ tbsp. vinegar, 1⅓ c. olive oil.

Method. Mix the dry ingredients, add egg yolks; mix these well and then add ⅓ tsp. vinegar. Add the oil gradually, a drop at a time, and keep stirring. As the dressing thickens, add vinegar and lemon juice; this will thin the mixture. Then add oil and vinegar until all is used, stirring constantly. Do not add oil too fast, or the dressing will curdle. This may be

remedied by using a yolk of an egg, and adding to the mixture. Place mixing-bowl in a larger bowl containing cracked ice that has a little water added to it. Have the olive oil thoroughly cold. The dressing may be made with a silver fork, small wooden spoon, or a Dover egg-beater.

The recipe for mayonnaise dressing found in " Cooking for Two " is excellent:

2 tbsp. lemon juice, 2 tbsp. vinegar, 1 tsp. powdered sugar, ½ tsp. mustard, if desired. A few grains of cayenne or paprika, ½ tsp. salt. The yolk of two raw eggs, 1 pt. olive oil.

Method. Mix the salt and paprika and add yolks of egg (strictly fresh); beat until the yolks are well thickened, and gradually beat in the lemon juice and vinegar. Place a Dover egg-beater with the mixture; beat in the oil, a teaspoon at a time; beat thoroughly between each addition of oil. Add more seasoning if needed. Cover with an earthen dish and let it stand in a cool place until time of serving.

If sugar or mustard, one or both, is desired, add to salt and pepper.

Cucumber and Tomato Salad. Arrange sliced tomatoes on crisp lettuce leaves. Add cucumber cubes about ½ inch square. Serve with mayonnaise or French dressing.

Lettuce may be used as a bed for any salad. As soon as purchased, sprinkle; place in covered pail in the ice-box. When preparing for use, cut off stems, separate leaves, and place them in cold water until time to put salad together. Wash very clean, place in a bag made of coarse netting and shake to dry them, and then wipe carefully with a soft cloth.

ORDER OF LESSON

1. Talk on place of salads in diet.
2. Importance of cold ingredients.
3. Use in summer.
4. Requisites for good salads.
5. Discussion of recipes.
6. Work.
7. Serve salad with wafers.
8. Dish-washing.

BUTTER

LESSON XXXI

Butter occurs in milk of all animals in form of globules of fat, coated with albumen, and suspended in the liquid.

Preparation. Cream is separated, aerated, and cooled, then ripened, and then churned. In churning, a mechanical rupture of albuminous envelopes takes place, and globules of fat cohere. The fat is then worked and kneaded to remove excessive liquid and proteid, which causes decomposition.

Division. Abnormal butter is foul-smelling butter, turnip-tasting butter, "cowy" butter, oily butter, and dappled butter. Bad-flavored butters are generally due to bacteria of certain forms which are produced by bad conditions.

Neutral butter is good, but it is not of proper flavor, for there has been no ripening.

Good butter is formed from favorable bacteria. "Starters" are sometimes taken from good butter. (Starters are samples of good butter containing favorable germs, put into butter before ripening).

There are two kinds of starters used, acid-producing and non-acid-producing. When the former are used, souring is hastened from excess of acid. Sometimes milk is pasteurized at 69 degrees to 70 degrees centigrade (below boiling-point) to diminish the amount of lactic acid in the milk.

An example of non-acid-producing starters is Dr. Conn's "butter bug," Bacillus No. 41. This is an acid organism, but it produces only a small amount of acid and delays the souring, since it hinders growth of other organisms. A large culture of this is added to the cream and the ripening is then carried on as usual. The flavor of butter is improved, because ripening is prolonged. It is called quick-grass flavor and resembles that of butter ripened by an acid-producing "starter." It retains the flavor longer than that made by acid species and its use is simpler, for no pasteurization and no technical knowledge are necessary. Its use is also wider, as it may be used in cream already containing lactic and other organisms.

Adulterations. Rancid butter is sometimes worked over. Electricity may be applied and purification accomplished by collecting fatty acids at one pole.

Mutton and other animal fats, palm-tree oil, cotton-seed oil and cocoanut oil are also employed for adulteration. Water (butter is melted, water and salt added, and mixture stirred until cool), starch, curds, saltpetre, coloring matter (annatto, turmeric, yellow wood, and chrome yellow), are added.

Butterine and oleomargarine are adulterations of butter.

Oleomargarine is freed as far as possible from

foreign matter, skin, muscle, connective tissue, etc. and then minced in a hasher. Then it goes to melting-tanks, which are warmed to about 39 degrees centigrade. Scum is removed and oil is cooled; stearin, being the least soluble of fats, begins to crystallize and is removed by filtration through cotton cloths. Pressure is then applied and stearin remains in the presses as a hard cake, while softer margarine is forced through, is then colored to imitate butter, and churned with milk to give it butyric flavor. It is then ready for food. It may be used alone or churned with butter.

To make over rancid butter, melt (butter melts at 337 centigrade), heat again, and chill with ice water. The butter rises to the top. Another way is to wash in lime water and then in clear water.

Read Knight's "Food and its Functions."

Composition of Butter: water 5–10%, casein 5, lactose 5, mineral 9, fat 80 to 85%.

Butter Fat: margarine 68, olein 30, fats yielding butyric acid, capric acid, etc. 2%.

Fresh butter contains ½ oz. salt to 1 lb. butter. It is tasteless and has poor keeping properties. For salt butter the limit is 8% salt.

Nutritive Value. Butter is the most digestible form of fat and, with other foods, is very nutritious. The proportion for one person is 1 oz. per day.

Care. In the store butter may be preserved by salt, sugar water (changed daily), tartaric or acetic acid, or it may be kept in hermetically sealed jars. In the household it should be kept covered and in a cool place away from other foods, for it absorbs odors readily.

Order of Lesson

1. Kingdom.
2. Class of foods.
3. Good and bad-flavored butter. Reasons for same.
4. Adulterations.
5. Composition.
6. Nutritive value.
7. Care of butter.

FOWL

Lesson XXXII

Fowls, turkeys, chicken, tame ducks and geese are called poultry. Partridges, quail, grouse, wild ducks and geese are called game.

Food Value. Flesh of duck and geese is so fat that it is not easily digested. Game, except wild duck and geese, is more easily digested than other flesh fowls, so it is suitable for the sick. The meat from the breast of poultry is tender but poor in flavor. The difference is the same as that between loin of beef and the round.

Selection. Chicken not over five months old is called spring chicken; over a year old it is called fowl. Spring chicken is best for broiling, as it is tender. Choose a fowl for fricasseeing. If a fowl is to be roasted, the tendons should be removed, but if it is to be fricasseed, they need not be removed as the slow cooking will soften them.

Tests — Chickens. The scales are yellow and soft, the breastbones yielding to touch. The chicken is pin-feathered and soft-boned.

Turkeys. Good turkeys have black legs, white

flesh, and plump breasts. Hen turkeys are usually better than gobblers.

Ducks. Young ducks have brittle windpipes, and soft and yellow feet. Ducks and geese are not good if more than a year old.

Fricasseed Chicken — Home Recipe. One fowl, 1 qt. boiling water or white stock, one small onion, salt, 2 tsp. parsley, cut fine. A few sprigs of parsley for garnishing.

Method of Preparing. Cut chicken into thirteen pieces, according to the following directions. Do not draw the fowl, but with a small sharp knife cut all the meat from the fowl. Then cut the skin between the legs and body, bending the legs back so as to snap the hip joints. Cut then through the flesh to these joints, taking off what is called the second joint and the drumstick from each side in one piece. Wash these and then separate. Now break the wing joints, and cut off the wings. Cut out the wishbone and a large piece of flesh by starting with the knife at a right angle to the upper part of the breastbone. Remove the meat on each side of the breastbone. Cut off the neck. The side bone is on either side of the tail. Make cuts between these bones and the tail, separating them from the backbone, and with them two strips of flesh, the best part of the fowl. Cut off the tail piece.

To remove the organs, hold the breastbone with one hand and the backbone with the other, tear these apart and take out the entrails. Take out oil bag. Wash all the pieces and the frame or skeleton in cold water. Do this quickly.

Method of Cooking. Put the chicken meat and

bones with the onion after browning the onion in chicken fat or drippings; add stock or water, and let it simmer about one hour. Now take out the bones, pour off the liquid, and let the meat brown, stirring and turning the pieces. Pour the liquid back, with enough water or stock to make about three cups; add the salt; then simmer another hour, or until chicken is tender. Place pieces on a hot platter, neck and tail in the center, breast and wishbone parts on top of these, second joints at one end, legs at other end, and wings and side-pieces on the sides. Thicken the gravy with flour mixed with cold water and pour over the chicken. Garnish with parsley. A border of rice is often served with fricasseed chicken.

Chicken stew is made in the same way, except that the fowl is not browned. In this case serve on slices of toast.

As this practice work is long, it will be necessary to give the pupils the recipe and method first and much of the discussion must be given while the chicken is cooking.

ORDER OF LESSON

1. Talk on classification of poultry.
2. Age of fowls to be discussed, and comparison of tender parts emphasized.
3. How to prepare fowl for fricassee to be discussed and method given to class.
4. Recipe.
5. Work.

DOUGHNUTS

Lesson XXXIII

Doughnuts may be used in place of cake. They should not be eaten often for they are not wholesome or easily digested, owing to the fact that they are fried in fat. Starch should be partly digested in the mouth and if the fat, which is not digested until it reaches the intestine, surrounds the starch, it compels starch digestion to take place there also, thus overworking the intestine and sometimes resulting in indigestion.

Doughnuts should not be fried in bubbling fat. If bubbling, it soaks more easily into the food. The fat should be deep enough to cover the doughnuts. Lard or drippings are usually used as a frying medium. Butter burns before any of the fats, and therefore is not so good for frying. Olive oil would be a good fat to use, were it not so expensive, for it does not burn readily. The fat should be tested by dropping in a small piece of dough. When the doughnuts are taken from the fat, they should be drained on brown paper.

Doughnuts — Home Recipe. 1 c. sugar, 2½ tbsp. butter, 2 eggs, 1 c. milk, ¼ tsp. cinnamon, 2½ tsp. baking powder, ¼ tsp. nutmeg, 1½ tsp. salt, 2 c. flour.

School Recipe. ½ tsp. butter, 1 tbsp. sugar, 2 tsp. egg, 1 tbsp. milk, 5 tbsp. flour, ¼ tsp. baking powder, 1 spk. cinnamon or nutmeg. This makes three doughnuts.

Method. Cream butter and add one half the sugar,

beat egg very light and add remainder of sugar, combine the two mixtures, add the milk. Sift together the dry ingredients and add to the mixture with enough more flour to handle, having the dough as soft as possible. Toss on a floured board. Roll to $\frac{1}{4}$ inch in thickness, shape with doughnut cutter. Fry in deep hot fat in wire baskets and drain on brown paper.

Raised Doughnuts — Home Recipe. The risen bread dough, 1 c. sugar, 2 eggs, 1 tbsp. melted butter, flour to roll out a soft dough, 1 s. s. cinnamon ornutmeg.

Method. Cream butter, add sugar gradually, and cream together; add beaten egg. Alternate milk and dry ingredients (which have been sifted together). Roll out and cut into doughnuts. Fry in deep fat (smoking hot). Test for fat (bread browns in 60 seconds). Fat should be motionless.

Experiment. Drop a piece of bread into bubbling hot lard. Take it out after a minute. Keep heating the lard until it smokes and is perfectly still. Now drop in another piece of bread; after a minute take it out. Break open both pieces and see which piece has taken up the more grease. See which piece has browned. A coating of grease affects the digestion of food.

From this experiment we may decide that food should be fried in still fat instead of in bubbling fat. The fat bubbles when bread is dropped into it because the water in the fat makes it bubble when heated. This water must boil away so that the temperature is raised above 212°. After it has all passed off, the fat becomes still, and the fat becomes hotter.

Notes

In school laboratories it is easiest to use lard, since other fats, as beef drippings, etc., will not be on hand. Explain this, and discuss why and what fats are best.

Read notes on fats in Book I.

Temperature at which fats burn: butter, 206° F.; beef, veal, mutton, suet, 302° F.; clarified fat, 336° F.; lard, 392° F.; goose grease, 500° F.; olive oil, 608° F.

Each pupil should make the dough for the doughnuts and fry them in small saucepans, or in a small iron dish, if there is one. It is not best to use the granite saucepan, as it is hard to remove the black. Or, the pupils may make their own dough and fry the doughnuts together in iron kettles, using wire baskets. It depends on what frying-dishes there are in your laboratory. It will save time if there are individual dishes that may be used. If the work is done in groups, shorten the preliminary discussion, which, in any case, must be short, as the practice work is long.

Order of Lesson

1. Review deep-fat frying, as in lesson on croquettes.
2. Explain recipe and compare with method of cooking and frying croquettes.
3. Discuss recipe.
4. Practice.
5. Wash dishes.

SHORTCAKE

Lesson XXXIV

Shortcake is used as a dessert. Since the proportion of flour and liquid is about the same, the consistency of shortcake dough is practically the same as the biscuit dough. Shortcake, as the name implies, has shortening in it to make it richer than such dough as is used for biscuits.

In handling dough for shortcake, the same cautions must be used as are necessary in biscuit-making; that is, the ingredients must be kept cold and the mixture handled as little as possible with the hands.

The dough, when cooked, is the basis for many desserts which are made by adding sweetened crushed fruits of various kinds between the layers of dough and upon the top. Strawberries are most frequently used. Raspberries, blackberries, peaches, pineapple, and other fruits, may be used. The shortcake may be served with or without cream.

Shortcake — Home Recipe. 1 pt. sifted flour, 2 tbsp. baking powder, or ½ tsp. soda and 1 tsp. cream of tartar, ¼ c. butter, 1 c. milk or cold water (scant).

Mix the salt, baking-powder and flour, and sift two or three times. Cut in the butter until fine like meal; or, if it is liked very short and crisp, melt the butter and add it hot with the milk. Add the liquid gradually, mixing and cutting with a knife, and use just enough to make it of a light spongy consistency. Scrape out the dough on a well-floured board. Toss it with the knife till floured. Divide

into two parts. Pat and roll each part into a large, round cake, the size of a pie plate, and bake in oven about 15 m. The dough may be divided into two parts and cooked on a griddle, or made into small cakes and cooked on griddle or in the oven. If a griddle is used, grease it well with salt pork or butter, and cook the cakes slowly, watching and turning them, that all may be browned alike. When they are well puffed up, put a bit of butter on the top of each and turn over, or move them aside and grease again with the pork, and turn over upon the freshly greased place. When browned on the other side and done, which you can judge by the firmness of texture or by pulling one partly open, serve immediately. Tear them open, as cutting with a knife makes them heavy and indigestible. If baked in small cakes in the oven, put them close together in a shallow pan and bake 10 or 15 m.

Strawberries for the Shortcake. Spread the layers with softened butter. Mash 1 pt. strawberries and sweeten to taste. Spread on the bottom layer, put on the other layer of the shortcake and spread some mashed berries and some whole berries on the top. Serve with cream.

Home Recipe. ¼ c. flour, ¼ l. tsp. baking-powder, 1 s.s. salt, 2 l. tsp. butter, 1½–2 tbsp. milk.

Method. The method is exactly the same as in the individual recipe for baking-powder biscuit, except for increase in shortening. Mix and sift dry ingredients and cut in the butter. Add milk gradually, mixing with knife, divide dough into halves, and roll each half into a cake. These may be baked in individual pie tins, or in one large pan, put close

together. If there is lack of room, each individual recipe may make one cake, which may be split when done.

This makes a very small shortcake. ¼ c. berries will be enough for each student. Sugar to taste, from 1 to about 6 tsp., depending on the berries and the individual taste. Crush the berries, after saving a few whole ones for the top, and add sugar to them. Spread between the layers and on top. Shortcake may be served hot or cold.

Notes

If the time allows it might be mentioned to the class that the shortcake dough could be made into small cakes and cooked on a griddle. It is certainly true that the shortcake will be more digestible if baked in the oven. The mixture may simply be made into one cake, and when done, torn apart to make the two layers. Do not cut the cakes, as it makes them heavy.

If for any reason you do not care to have strawberries for the fruit, use pineapple.

Review batters. Compare other doughs, biscuit, bread, ginger-cooky doughs, etc., with shortcake mixture in respect to proportion of ingredients, amount of liquids, thickness, and mixing.

While the shortcakes are baking, the students may prepare the berries, in order to be ready to put cakes together when baked.

ORDER OF LESSONS

1. Review batters and dough.
2. Compare recipe for shortcake and baking-powder biscuit.
3. Discuss recipe.
4. Work.
5. Serve shortcake.
6. Wash dishes.

FIRELESS COOKER

LESSON XXXV

One lesson may well be devoted to the demonstrations of cooking in the fireless cooker, as it is a valuable article and can be constructed at home.

History. The principle was discovered in Norway. A Norwegian cook-box was exhibited at the Paris Exhibition in 1867. Food in tin utensils was placed boiling hot in the box and kept for some time. This box was lined with felt which retained the heat. Peasants in Germany used a similar method when they placed kettles of boiling soup in feather beds to cook over night. In a consular report from Germany in 1905, the wife of the Director of the Industrial School at Frankfort is reported as using the Norwegian method of cooking. She said that at first she used the hay-box to keep foods warm, but soon found that the cooking continued.

Use. The fireless cooker can be used to finish all boiled and roasted meats, sauces, fish, soup, vegetables, fruits, puddings, etc. It cannot be used for beefsteak, cutlets, pancakes, and other articles that

require rapid cooking on a hot fire, but these can be done for the meal while the rest of the meat is in the box.

The principles involved in the fireless cooker are: first, conservation of heat, i. e. the retention in foods of heat developed by contact with the fire; second, the cooking of foods with temperature below the boiling-point.

Hay was at first used to pack the cooking utensils and so the name "hay-box" came into use. A cooker can be made of an ordinary box with hay packed tightly around the agate pails in use for cooking utensils. Newspapers or excelsior will do instead of hay for packing, and old table cloths, sheeting or canton flannel will do for placing over the hay, excelsior, etc.

Boxes lined with asbestos are of course much better. A box is often placed inside of a larger box, also lined with asbestos, and the space between is filled with sawdust. Hay is harder to pack, and food has been known to taste of hay. A cooker could easily be constructed by using an old box, lining it with asbestos, filling in around the agate pails with hay or sawdust, and covering the filling with cotton flannel, tacking this neatly to the edges of the box. The cover must also be lined with asbestos and the filling, and then cotton flannel tacked on. The cooker may be purchased at the hardware store, single-pail cooker from $4 to $6, double-pail cooker from $6 to $10, depending somewhat upon the finish of the box.

It would be well to have the first class in the morning see the first process of the fireless cooker, i. e. the

cooking of the article on the stove and placing it in the cooker. The last class could see the results. The week following, the second class could see the process, etc. Then have the girls do the same at home and report on the results the following week.

Recipes for Fireless Cooker

Pot Roast. Get a 3 lb. piece of beef, cut from the neck or shoulder, clean it, season, dredge with flour and brown well on all sides (in a hot greased frying-pan). Put meat in a pail with an inverted saucer or something else under it to keep it from sticking. Add boiling water about two-thirds of the way up the roast, cover tightly, and let simmer 20 m. Then add ½ c. each of diced carrots, turnips, potatoes, and onions, and 1 tsp. salt. Let it come to a boil and then place in fireless cooker for 5 or 6 hrs. Remove meat to a hot platter, surround with vegetables and then make a gravy of 1 tbsp. butter, 1 tbsp. flour and 1c. of the liquid strained from the roast. Season, and serve with meat and vegetables.

Apples in Syrup. Pare sour apples in half and core. Make a syrup of 1 c. of sugar and 1 c. water. Cook over fire until clear. Add apples and boil 5 m. Place in fireless cooker for 4 or 5 hrs.

Steamed Rice. ½ c. rice, 3½ c. milk or water or part of each, 1 tsp. salt. Look over and wash the rice thoroughly. Add slowly to salted boiling water, or milk. Boil on stove 5 m., then place in fireless cooker 1¼ hrs. to 2 hrs.

Steamed Custard. 1 qt. milk, 4 eggs or 10 egg yolks, ¼ tsp. salt and ½ c. sugar. Scald the milk in a double boiler; beat the eggs slightly and add sugar

and salt, then, gradually, scalded milk, beating meanwhile. Pour into a buttered can or pail, cover tightly and place liquid in another pail. Half cover with boiling water. Boil over fire for 5 m., then place in fireless cooker for 1¼ hrs. It is well to place an inverted saucer in the bottom of the pail of hot water, so that custard will not get too hot while cooking on the stove. Serve the custard with caramel sauce.

Caramel Sauce. ½ c. brown sugar, ½ c. boiling water. Melt sugar in a frying-pan until it becomes a light brown liquid, stirring constantly. Add boiling water and cook 10 m. This sauce can be made a week or two before using and kept in a Mason jar.

Chicken Fricassee. Unjoint chicken and roll each piece in flour. Brown pieces in fat; as each piece is browned pack in kettle of cooker. Make some gravy in pan in which browning is done. Place gravy in kettle and add enough water to cover chicken. Season to taste with salt and pepper. Boil 20 minutes and cool in cooker over night. In the morning re-heat for luncheon.

ORDER OF LESSONS FOR FIRELESS COOKER

1. Discuss principle of food that is brought to a boiling point over a fire and enclosed in such a way that it must continue to cook.

2. It saves fuel and utilizes cheap and nutritious foods.

3. Particularly good for tough meat, dried peas, beans, corn and fruit.

4. Good for busy women, who have outside duties and inside home duties. United States Army uses Fireless Cooker, as it saves time. On the march, after breakfast, dinner may be prepared and served on arrival at camp. Hotels use it as a time-saver; large packing-houses for economy. In boiling ham for market, it saves in shrinkage.

5. Discuss recipe.

Pot roast suggested for the lesson.

BOOKS OF REFERENCE

Miss Farmer's Boston Cooking-School Cook Book, Revised edition.

Wilson's Domestic Science.

Williams & Fisher's Elements of the Theory and Practice in Cookery.

Janet Mackenzie Hill's "Cooking for Two."

Bulletins, United States Department of Agriculture.

Knight's Food and its Functions.

Colton's Elementary Course in Zoölogy.

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